The Views of Educational Psychologists about Neuroscience: A Discourse Analysis

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Student Declaration

This work has not previously been accepted for any degree and it is not being concurrently submitted for any degree.

This research is being submitted in partial fulfilment of the requirements of the Professional Doctorate in Educational and Child Psychology.

This thesis is the result of my own work and investigation, except where otherwise stated. Other sources are acknowledged by explicit references in the text. A full reference list is included in the thesis.

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Tamara Hussain
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Abstract

The field of neuroscience has received more and more publicity over recent years, specifically by its claims to contribute to the understanding of childrens' learning, education and development. However, progress in neuroscience findings and its links with education have also been subject to controversy, particularly with regard to how far the brain can inform understanding of social processes. While educational psychologists have been identified as a discipline potentially central to the debates about neuroscience (Hall, 2004), little research has yet investigated the views of educational psychologists about the value or relevance of this field in their discipline.

This research presents an analysis of views of ten educational psychologists from two Local Authority services. The researcher carried out semi-structured interviews and analysed the data using two approaches from the Discourse Analytic tradition. Methods from Discursive Psychology and Foucauldian Discourse Analysis were used to investigate how educational psychologists discursively constructed the role of neuroscience in their discipline.

The combination of research tools yielded rich interview data. Ten discursive sites were identified. Neuroscience was simultaneously viewed and identified discursively as the Identification of Pathology or Deficit, an Additional Explanatory Model, A Challenge to the Social Constructionist Worldview, and Knowledge for Responsibility and Duty. Implications of these findings for Educational Psychology practice are discussed. The prevalence of professional eclecticism in the discipline was evident. Reference to educational psychologists' frameworks and models for practice were notable and was considered as points for discussion. Educational psychologists' constructions gave rise to a variety of different subject positions, and therefore the actions that are made possible by these positions. Methodological issues are also considered, together with suggestions for future research.

Table of Contents

List of Appendices

Glossary

This glossary has been included here to define a number of terms which are referred to in the body of this research.

Archaeology	A Foucauldian approach exploring how systems of thought are governed by rules.
Attachment Theory	An understanding of the affectional tie between an infant and their caregiver.
Biomarkers	Biological indicators of developmental risk.
Bio-medical discourse	Discourse or language that draws on biology, medicine and scientific terms.
Brain Cell	A structural or functional unit of the brain, also termed *neuron*.
Brain Imaging	Techniques used to measure activity in the living brain, such as EEG, MEG, fMRI, and PET.
Central Nervous System	The brain and the spinal cord.
Cognitive	Explanations in terms of psychological constructs
Cognitive Neuroscience	An academic field concerned with the scientific study of biological substrates underlying cognition.
Critical Period	A period in which an opportunity for biological development is at risk of closing.
Development Disorders	An impairment of normal development linked with the developing brain.
Developmental Neuroscience	The study of the processes that generate, shape and reshape the nervous system. Also called neural development.
Educational Neuroscience	Study of the application of neuroscientific findings to education.
Enrichment Activities	Providing extra activities for children with the belief that these will speed up growth and development.
Geneology	A Foucauldian approach to explore how given systems are shaped by turns in history.
Intraparietal Cortex	An area of the brain likely to be linked to eye movement.
Lesion studies	Research into the brains of individuals who have sustained damage to a part of their brain.
Limbic System	Networks in the brain, controlling basic emotions and drives.
Malleability	The ability of the brain to change and grow.
Neuro -	The term neuro- (referring to 'the brain', specifically the 'nerve cells' carrying information throughout the brain).
Neurobiology	A term sometimes used interchangeably with neuroscience.
Neurology	Study of the disorders of the nervous system.
Neuropsychology	Study of brain impairments.

Plasticity	The ability of the brain to change as a result of new demands placed on it.
Pruning	The shedding of connections between brain cells.
Sensitive Periods	A developmentally important period in childhood.
Synapses	A connection between two brain cells.
Synaptogenesis	The rapid growth of connections between cells.
Tempo-Parietal Cortex	An area of the brain believed to be linked with phonological processing.

1. Chapter One: Introduction

Neuroscience, conceptualised as the study of the function and processes of the brain (Blakemore and Frith, 2005), has been the subject of ongoing publicity, discussion and debate over the past two decades, particularly with regard to its relevance in education (Geake and Cooper, 2003). Various authors have put forward their views about neuroscience from the fields of research, education, psychology and philosophy. These views arise out of the claim that neuroscience can offer new and valuable insights into how children learn (Goswami, 2004). References are made to internal brain mechanisms, which are said to be responsible for developments in such areas as literacy (Goswami, 2004), mathematics (Butterworth 1999; Ansari et al, 2007), and, more recently, developmental difficulties such as Autism (Baron-Cohen, 2003). The implications are that knowledge about neuroscience can enhance learning and advance education and educational practice. However, views surrounding such claims have been divergent and conflicting. For example, while some authors view neuroscience as potentially transformative for education, and use the language of optimism when making reference to neuroscientific ideas (Geake and Cooper, 2003), others are more cautious about the applicability of neuroscience to education, claiming that the field challenges the central philosophy of teaching and learning (Bruer,1998; Bakhurst, 2008). Many perspectives have also historically circulated in literature, and have re-emerged in current debates about how far the brain should be influence our understanding of learning and education (Samuels, 2009). While many such views have been advanced by educators, philosophers and scholarly communities, few have emerged from educational psychologists, and exploring such views is the main aim of this research.

1.1. Defining Neuroscience

Neuroscience is a broad field, encompassing the areas of neurology, psychology and biology (Hall, 2004). Neuroscience has been referred to differently across texts. While the Oxford dictionary defines neuroscience as ‘all

sciences concerned with the nervous system and the brain' (Pearsall,10th Edition, 1999). Goswami (2004) refers to it as a study of the 'ways in which the brain learns and remembers' (p. 74). The study of neuroscience has involved understanding of aspects of physiology or biochemistry, such as molecular and cellular activity (Zull, 2006), however this research will focus mostly on systems and functions specific to the brain, with less focus and reference to the physiological and biochemical processes underlying cognition and learning. The Glossary makes references to some of the branches of neuroscience. However, the present research makes particular reference to cognitive and developmental neuroscience when referring to studies that are relevant to educational psychology. Recently, the branch of educational neuroscience has also emerged which combines cognitive neuroscience and education theory to explore the links between biology and education (Fischer and Goswami, 2010). This research draws mostly on the above three branches of neuroscience, making particularly reference to neuroscience linked with the areas of learning and education.

1.2. Publicity of a Newly Emerging Field

The alignment of neuroscience with the field of education is only a recent phenomenon, following what has been referred to as 'technological advances' in neuroscience in the past two decades (Goswami, 2004). The prominence of neuroscience was most notably made by the US president's announcement to the 101st Congress in 1990 that the subsequent ten years would mark the 'decade of the brain' (Hamos, 2005, p. 275). Following this, there was a marked increase in interest among professional, academic and the public about the potential of neuroscience to inform education and education practice. These developments were evident in the local and international efforts that followed. For example, researchers from the British Institute of Cognitive Neuroscience, Blakemore and Frith (2000), completed a report commissioned by the Economic and Social Research Council, about the state of neuroscientific research and its implications for education. Findings were presented to the *House of Commons* in the same year to consider the impact on education policy. Within this period the Organisation for Economic Cooperation and Development (OECD, 2002), commenced a project which brought together international researchers to link

the emergent findings from brain research and discuss further implications for policy makers. These developments suggest a growing awareness about the potential value of integrating the two fields.

The developments led to an apparent interest in educating professionals, particularly those in pedagogy. Samuels (2009), for example, refers to the move to create 'neuroscientific literacy' (p. 52). He states that, 'Various attempts from books to conferences, to calls for changes to graduate training have been directed to the goal of neuroscientific literacy' (Samuels, 2009, p. 52). In line with this interest, Harvard University established a Master's programme entitled *Mind Brain and Education* (2007), with an associated journal. There have subsequently been a range of publications in the years that followed which were aimed to inform, educate and evaluate the developments and findings for both professional and scholarly communities with a view to advancing knowledge about neuroscience.

This level of publicity and interest has suggested that the neuroscience could potentially become a prominent 'body of knowledge' to inform the education field. To legitimise the value of the connection, authors have referred to a range of findings that have shed light on understanding about learning. Goswami (2006), one of the prominent voices in the neuroscience-education movement, states for example, 'one of the fundamental pillars supporting the link between education and neuroscience is the ability of the brain to learn' (p. 408). Goswami (2006) further states that 'Neuroscience is developing and increasing our understanding of early brain development, and how these brain changes might relate to learning processes'. (p. 96). Examples of successful neuroscience, according to Goswami 'have resulted in advances in our understanding of dyslexia and dyscalculia…' (p. 96) Goswami (2004) also refers notably to 'biomarkers' in reference to certain stages of brain development which could help identify children who are at educational risk. The value of neuroscience knowledge therefore appears to lie in its ability to clarify and inform understanding about learning, and uncover knowledge about areas of learning needs which are applicable to educators and education professionals.

1.3. A Topic of Controversy

The value of neuroscience and its links with education however, has not gone without criticism. Amidst the views presented, the researcher has noted that there has been discord about the extent to which the field of neuroscience could inform education. One issue has circled around the oversimplification of findings (Geake, 2008; Purdy, 2008). For example, in connection with the growing recognition of the value of neuroscience knowledge, people with commercial interest have attempted to simplify brain science research to make it more understandable to non-scientific communities (Sylvan and Christodoulou, 2010). Findings from neuroscience, for instance, began to enter the popular media (Geake and Cooper, 2003), and there are accounts that texts and became highly 'simplified' to allow greater understanding and accessibility of brain science to educators, parents and the broader public (Brandt, 1999). The OECD (2002) first coined the term 'neuromyth', referring to the 'misapplication' of neuroscientific findings to educational contexts. As such claims developed, it appears, so too did criticism about the links being made. John Bruer, in 1998, known as one of the most 'outspoken critics' of the brain-education link suggested that going from brain science to education is a 'bridge too far' (p. 5). In Bruer's view, connecting brain science directly to school-related learning is not a straightforward link, and has lead to oversimplification of research by communities that are less knowledgeable about the area.

The presence of such neuromyths has lead to controversial views about neuroscience. It has questioned, for example, how far educators are the appropriate people to apply neuroscience knowledge. At the heart of the debate, there is also the view of the incompatibility of the two disciplines of neuroscience and education. Samuels (2009), for example, has spoken about the separate and distinct historical developments of the two fields, namely education and science, leading to different questions that each have posed about human learning and development. The dichotomy between the two disciplines has been illustrated through contrastive ideas such as science drawing on simplistic conclusions, while education research findings as complex and multi-faceted. Samuels also highlights that while education has drawn from

constructivist knowledge, neuroscience has been driven by the positivist (scientific) position, each leading to different methods of enquiry, and therefore reaching different conclusions about human learning and development. In addition, Howard-Jones (2008) has stated that neuroscience and learning has emerged from two different philosophies, and learning in the context of education is very different to the physiological processes in the brain which underlie that learning. By such assertions, authors reveal the growth of neuroscience as an object of discourse, in that neuroscience has become subjected to the varied views and opinions of people from different research and professional communities. The claims have drawn criticism and debate, leaving the status of neuroscience as contentious and controversial.

1.4. The Voice of Educational Psychology in Neuroscience

While views about the integration of neuroscience with education have been advanced by researchers in such areas as education, philosophy and science, the voice of educational psychologists have featured little in these debates. Educational psychologists apply psychological knowledge to help identify and assist young people with various learning difficulties (Frederickson & Cline, 2009). They draw on a range of factors for the assessment and intervention for young people who present with learning needs, or help enhance their learning outcomes (Racket & Holmes, 2010). The role of educational psychologists include communication, consultation, training and collaboration with a range of professionals, the most frequent of these being teachers, together with health and education professionals who work closely together with children and young people (Racket & Holmes, 2010).

Very recent developments in neuroscience would suggest that educational psychologists (EP) would be central to the debates surrounding neuroscientific findings and their implications. For example, Blakemore and Frith (2005) refer to the brain's basis in development disorders such as Dyslexia, Dyscalculia, Attention Deficit Hyperactivity Disorder, areas with which educational psychologists are typically engaged (Frederickson & Cline, 2009). Goswami (2004) also draws the links between neuroscientific findings and special

education. The international Organisation for Economic Development and Innovation, responsible for disseminating current research and policy implications for newly researched fields, propose that linking neuroscience to education should be a transdisciplinary effort (OECD, 2002), and intermediary disciplines, such as cognitive and educational psychology should 'bridge the gaps' between neuroscience research and education.

Besides greater understanding of policy implications in education at local and national level, the possible pathways suggested for educational psychologists' involvement have included assessment, intervention and helping to shape the design of teaching strategies (OECD, 2007). In a very recent *Issue* of an Educational Psychology journal, published in the U.S., Benton (2010) states that:

> *Educational Psychologists should learn more about brain science research methods and principles. They can play either a prescriptive role, helping to identify relevant research questions, or the middle person role, translating neuroscientific findings to…. teachers.* (p. 108)

In a more local UK journal, Goswami (2004) has stated that…'neuroscience may also offer methods for the early identification of special needs, and enable assessment of the delivery of education for special needs. (p. 2).

The implications are that neuroscience may benefit from the involvement of intermediary disciplines such as educational psychology, to identify and assess the needs of learners and those at educational risk, clarify understanding and possibly dispel inaccurate ideas that circulate.

However, such assertions presuppose that educational psychologists are engaged with the education-neuroscience agenda. Yet, a careful review of literature would suggest that the voice of educational psychologists feature very little in dialogues about neuroscience or its links to developments in learning. Few references in educational texts, and fewer publications in the field, would suggest that the area of neuroscience is not prominent among the discourses of educational psychologists.

1.5. Research Focus: Aims and Rationale

At the height of the debates that have so far circulated, and in view of the implications for educational psychologists, the researcher finds it timely and critical to seek the views of educational psychologists about the emerging area of neuroscience in an effort to gain an understanding of its potential role in their discipline.

The researcher was particularly interested in the role of language in the production of views. The researcher was drawn to the various debates surrounding neuroscience, and has noted that language is the key tool with which these views are being expressed. The researcher begins with the rationale, that to obtain an understanding of a speaker's view about a particular topic, it is necessary to uncover different *variations* or 'constructions' of meaning that are used to express such views (Potter & Wetherell, 1987). This idea is prominent in the discourse analytic approach which has been used as a tool for this research.

The approach of discourse analysis recognises that certain concepts and terms have been 'positioned' in certain ways by the language used to refer to them over time. This language, its patterns and meanings can be thought of as 'discourse'. Discourse defined fully, is 'an institutionalised way of talking that regulates and reinforces action and thereby exerts power' (Jager and Maier, 2009, p. 35). Language, in the discourse analytic view, creates 'reality' about certain phenomenon and brings about certain possibilities for action and change.

The debates have prompted the researcher to investigate whether educational psychologists find neuroscience a relevant adjunct to their theoretical understanding and practice. More specifically, how do educational psychologists discursively construct the role of neuroscience in their discipline?

Through gathering the talk of ten educational psychologists' using semi-structured interviews, it is hoped that the responses to this question would help shed light on EPs' views about the possible role of neuroscience in their field,

and potential implications for EP's future engagement with this newly emerging area of knowledge.

1.6. Chapter Summary

The purpose of the present Chapter was to highlight the relatively new alliance between neuroscience and education, and its implications for educational psychologists. Given the publicity of the emerging area of neuroscience, the importance of seeking the views of educational psychologists was highlighted as a particular area of importance.

Further chapters to follow in this thesis will include a literature review, drawing on key literature that highlights the claims of neuroscience research, particular in relation to education and educational psychology (Chapter 2). This will follow a chapter introducing and outlining the discourse analytic methodology adopted within this research (Chapter 3), presentation of the research findings (Chapter 4), followed by a discussion section (Chapter 5). A conclusion and summary of this thesis, including implications for future research, will also be presented. The next chapter (Chapter 2) will present a literature review based around the topic of research. A critique of literature within this field will be undertaken, followed by a discussion of the methodology adopted. The chapter will conclude with the research questions.

2. Chapter Two: Literature Review

2.1. Overview of Chapter

The previous chapter introduced this research with regard to the background, rationale and aims of this study. It provided an overview of the publicity of neuroscience, particularly in relation to the field of education and the debates surrounding this. It also introduced the approach of discourse analysis as a tool for this research, particularly in relation to seeking views.

This chapter provides evaluation of key areas of literature related to this research. The Chapter firstly provides a rationale for the approach to the literature review adopted in this research (2.2). Then, details relating to the literature search will be provided (2.3). The Chapter will continue with background information about developments in neuroscience which are relevant to educational psychology (2.4). Following this, there will be an overview of the key debates surrounding neuroscience research, particularly in relation to education (2.5). This will link onto a discussion about Discourse Analysis as a research tool, and how the approach is particularly relevant to seeking views (2.6). The sections following this will consider previous research which has focused on the views of educational psychologists, and research linking educational psychology with neuroscience (2.7-2.8) Finally, the area of focus for this research and research questions will be introduced (2.9) and a chapter summary provided (2.10).

2.2. Approach to Literature Review

This section provides a rationale for the approach to literature review adopted in this research. A literature review can be described as an investigative task, which helps to determine whether the topic under question is worth studying, and it provides an 'insight into ways in which the researcher can limit the scope to a needed area of enquiry' (Creswell, 2009, p. 23). A literature review also contributes to the 'larger, ongoing dialogue in the literature, filling in gaps and extending prior studies' (Creswell, 2009, p. 24) In discussing different forms of literature reviews, Tranfied et al. (2003), differentiate between *systematic*

and narrative reviews. The contrast between these two is considered here, for the purpose of the present research.

In the case of a systematic review, the researcher sets out and follows explicit procedures for review of the literature (Tranfield et al, 2003). Systematic approaches use the literature in a deductive way, usually beginning with specific terms and hypotheses, which are then used to compare with former studies during the critical review of literature. Where a research is exploratory in nature, that is, where the topic under investigation is relatively new, narrative reviews may be more appropriate. Narrative reviews are used to generate understanding about the variety of human discourse around a particular topic area, which are less focused or explicit in the steps followed. Narrative reviews can be interpretative in quality and are also thought as wider ranging in scope of the search that is undertaken. The narrative approach also provides a researcher's reasoning about why the research topic and questions were arrived at, by use of the wider literature.

The review that follows can be considered as a primarily narrative review. That is, little has been written about the area of educational psychologists' views about neuroscience, and the review traces the process of discovery about why investigating this area is relevant and important. Considerations such as who has been writing about the topic area, who studies it, and who has indicated the importance of the issue, have been undertaken. A large amount of literature was reviewed, and these included peer reviewed journals, textbooks as well as some media texts. In the introduction to the review, however, the researcher has also provided a systematic literature report (see Section 2.3), which will show how decisions were made about texts chosen using database searches. The researcher also highlights considerations such as inclusion and exclusion criteria. This enabled the researcher to review the literature in an exploratory way, while also retaining the benefits of a systematic review. This is intended as an aid for future replicability of the research, as it helps to trace how decisions were made about texts chosen. The next section provides details regarding the literature search.

2.3. Literature Search

The literature search begins by tracing some of the key developments in the term neuroscience. Given the transdisciplinary contexts in which the term emerges, the researcher decided to carry out a multiple database search, using the two terms 'neuroscience' and 'education', and separately 'neuroscience' and 'learning' . The researcher entered the following five main databases which have a focus on publications linked to the fields of education and psychology: Academic Research Complete, EBSCo, PsychINFO PsycARTICLES and ERIC**.**

The researcher wanted to restrict the term's use within the education and learning contexts, as it is these areas that educational psychologists' involvement has been called for. The researcher applied filters of subject: [brain] and [neurosciences], and thesaurus terms [education], and [learning].

The researcher's search using 'neuroscience' and 'learning' yielded more results than did education and neuroscience, suggesting that while links between education and neuroscience was relatively new, neuroscience has historically had far more links with the area of learning. This suggests that references to neuroscience was made available in educational literature more recently. A high proportion of these were published in PsychArticles and PsychInfo (two psychology databases), listing prominent journals in the area of brain research, such as *Behavioural Neuroscience*. A high proportion of these were from animal or lesion studies, discussing brain structures linked to certain skills that were investigated.

Post-1990 search

The researcher had consulted a key text by Blakemore and Frith (2005), suggesting that new methods in neuroscience began to emerge in the 1990s which gave rise to developments in neuroscience findings relevant to education. A separate search was therefore carried out using a 1990 to 2012 filter. The post-1990 search revealed a marked change in the database listings, now incorporating more education-related publications. *Mind, Brain and Education* (Harvard University), was the most prominently cited journal in this category.

Articles considered for review contained terms such as ‘views’, ‘perspectives’ and ‘discourse’, alongside the terms ‘neuroscience’ and ‘education’.

Separate searches into the areas of mathematics, literacy, were isolated by using subject filters. Other areas such as adult education and pathology were disregarded from the search, as these were seen as less relevant to the aims of this research. Additional searches were also carried out in the area of discourse analysis. Appendix A provides a table detailing information about the Literature Search, including texts which were selected for review. Of the articles considered, abstracts were read and those specifically linked to the topic area, such as those offering particular views within the research and education community were selected for review. Articles and texts which described the main developments in the field of neuroscience were also reviewed. Only one article was found which drew views from educators using a quantitative paradigm. No systematic research was found which specifically drew the views of educational psychologists, specifically though interactive verbal discourse.

The researcher also consulted academic textbooks, and key texts about neuroscience to explore the reference to the study of the brain and neuroscience, and was informed by research cited in these.

2.4. Neuroscience Research Relevant to Educational Psychology

The following section on research in neuroscience will be included in this review to further highlight why neuroscience may be perceived as an important area for educational psychologists. Due to the extensive literature on neuroscience in relation to learning, it will not be possible to provide a full coverage of all the areas relevant. The sections will therefore be selective, and some examples will be given to put forward a case for the relevance of brain research in educational psychology. The following sections specifically consider what authors in the field of education psychology and other related disciplines, such as education and psychology, have said about the relevance of brain research in the field of educational psychology.

2.4.1. The Discourse of Science

Examining the research in neuroscience firstly involves entering into a specific discourse of biology and medicine, abbreviated as 'bio-medical' discourse (Treichler, 1987). This discourse typically utilises 'specialised language' surrounding the methods used for study and for the explanation of research. In terms of brain research, this pertains to the examination of anatomical, physiological and structural features of the brain, each labelled with specialised terms and references (Treichler, 1987).

Although literature on educational psychologists' views about neuroscience have been very few, Byrnes and Fox (1998), in a US publication, entitled *Educational Psychology Review,* were two of the first authors to offer a comprehensive review of research areas that were, at the time, perceived as relevant to the field of educational psychology. The authors primarily present an overview of neuroscience research in the areas of attention, memory, reading and maths. However, they also make reference to 'categories' of knowledge that they see as relevant for educational psychologists. They argued that, '..in order to know how to improve student learning… an educational psychologist has to have an accurate and sufficiently precise model of learning or motivation' (p. 299). Byrnes and Fox contended that brain research helps to establish accuracy and quality for a particular theory, while offering an additional level of analysis to understanding difficulties in learning and development. Their argument, in terms of the applicability to educational psychologists, was not just that neuroscience was accepted at face value, but that educational psychologists would need to be informed and critical about its use in research, to judge the quality of research, and consider the usefulness of its application.

One main area or 'category' of knowledge referred to is linked to the use of methods. Byrnes and Fox (1998) include discussion about how educational psychologists are invited to become familiar with methods used in brain research. Examples given are the use of *lesion studies*[1]*, imaging techniques*[2]

[1] Research into the brains of individuals who have sustained damage to a part of the brain (McCarthy and Warrington,1990).
[2] Computerised generation of images of the brain corresponding to lesions or tumours; images indicating locations of the brain which are active when an individual performs a task.

and *animal studies*[3], which have comprised the major tools to investigate different areas of learning. Another category of knowledge is the distinction between functions and processes of the brain. Function refers to the knowledge of the workings of specific areas of the brain. Processes on the other hand, refer to the physical movement or activity in the brain, such as the growth and connectivity of brain cells and their synapses (Huttenlocher, 2002).

The final category of knowledge is in reference to specialisation (for example, whether certain brain regions are specifically allocated to certain skills, for example, mathematics) and globalisation (where many parts of the brain work together to carry out a certain skill). Current understanding that has developed (for example, Hall, 2004), involves accommodating both views, in that functions may be distributed widely across the brain and different areas perform in parallel. However, some specific 'functions' are also said to be localised to specific areas, corresponding to certain skills such as counting and reading. Equipped with knowledge about such categories and distinctions, Byrnes and Fox (1998) contend that educational psychologists would have another valuable 'explanatory vocabulary' for the cognitive theories that they typically use in understanding children's learning and development.

2.4.2. Early Development

One proposal by Byrnes and Fox (1998) is that 'knowing how brain develops helps psychologists understand how things can go wrong' (p. 134). The development and growth of certain organic structures in the brain, such as that of cells, their organisation, and connections between them, for example, has been the bases of discussion around the critical nature of early childhood development. This section considers the area of early infant development, and how research into the role of early experience on later development has impacted education and may have possible implications for educational psychology.

[3] Surgical techniques such as making incisions or removing parts of the brain to observe losses of function.

In considering the early years, reference is made to developmental theories, or theories linked to the development of the brain (Blakemore and Frith, 2005). These developmental theories suggest that atypical or non-typical development early on is associated with problems later in life. In turn, such an assertion may have implications for EP involvement and intervention.

The central theme of the importance of the early years is that connections between cells (a process termed *synaptogenesis*) in the infant brain are formed and are said to be related to early experience. Over time the strength and quality of these connections are thought to impact learning. Owing to the research of Hubel et al (1965), and Carlson et al (2002), on critical periods of synaptic growth in cats and primates, terms such as *pruning*, *sensitive periods* and *plasticity*, became incorporated into the particular discourse of the 'early years'. Pruning refers to the 'shedding' of surplus connections between neurons so that pathways between them become more efficient. 'Sensitive periods' refer to the period where learning experiences must occur at a certain time if the brain is to develop normally (Hubel et al 1965). Finally, Hall (2004) refers to the term plasticity as the 'ability of the brain to change as a result of learning, or in response to environmental changes….., and are particularly apparent in, but not confined to infants in the early years' (Hall, 2004 , p. 28).

Following research on the growth of connections between brain cells, a process termed synaptogenesis, Huttenlocher (2002) claimed that:

> *….the brain is more malleable during infancy and early childhood than later in life. This malleability leads to an increased capacity for learning, which in turn provides an opportunity for the improvement of cerebral functioning that cannot be reproduced to the same extent or with the same ease later in life (p. 4).*

Malleability in Huttenlocher's reference refers to 'change' and the ability to adapt to experience. The implications are that the early years form a particular period in which children are seen to have the capacity for an 'optimum' level of learning. The brain, on the other hand, is said to lose this 'malleable' feature later in life. Such research and assertions linked with them are said to highlight that the quality of early experiences are particularly significant.

Some criticism, however, has advanced at the usefulness of research tools, such as the use of animal research in understanding infant brain development. For example, although the same qualitative changes occur in the brain of monkeys, as in the case of research on synaptogenesis, the trajectory is said to be quicker than the rate of change in the human infant brain (Hoffer, 1987). Nonetheless, understanding such differences and applying a different time scale to such changes have lead scientists to draw tentative conclusions about brain development and its implications. Terminology has also shifted as an outcome of greater awareness. For example, scientists no longer refer to changes as critical periods, but have termed these as *sensitive periods* (Blakermore and Frith, 2005). Thus, Byrnes and Foxs' (1998) assertion that educational psychologists should be aware of not only the outcome of findings, but also the particular *methods* of research, seem to be applicable, in that accurate judgements are needed to understand research and thereby consider their implications.

Such findings have lead to the growth of interest and awareness about the role of experience in the early years. Mayer (1998) makes reference to the role of *readiness* in learning. Mayer contends that, 'Cognitive neuroscience provides justification for intensified research with young learners to assess what they are capable of learning' (p. 414). Blakemore and Frith (2005) refer to the developments in policy and practice surrounding early child care in the UK. The development of early education, such as Early Learning Goals (QCA, 2000) can be linked to the concept of readiness. Debates that have also arisen have been in relation to such ideas as *hot-housing*, where infants are provided with intensive levels of educational experiences through *enrichment* activities, in order to take full advantage of their 'sensitive periods' (Blakemore and Frith, 2000). However, most recent views about such developments are that 'Any normally stimulating human environment will be (in neuroscientific terms) sufficient for normal human infant development' (Hall, 2004 p. 28). Moreover, it has been established that it is only certain skills and abilities which must develop early on. For example, the consensus has been that motor or sensory skills in infants are one of the first skills acquired and linked to the early developing brain. Identification early in life means that the process of

remediation can take place sooner (during a time, for example, when the brain is more 'malleable').

Of relevance to these debates is perhaps educational psychologists work in the area of attachment. Attachment theory (Bowlby 1989; Ainsworth, 1968) is based on the belief that the adult-child bond is the essential and primary force in infant development, and thus forms the basis of coping, negotiation of relationships, and personality development (Ainsworth, 1968). Cozolino (2006) addresses the critical role of the brain in social relationships. He states, for example, 'The human brain itself is a social organ' and to truly understand human beings, we must understand not only how we as whole people exist with others, but how our brains themselves exist in relationship to other brains (p. 2). Such a reference to the brain as 'social', and existing in relationship with other brains seems to ascribe to the brain its central importance in the development and maintenance of social relationships. A type of condition called Attachment Disorder is characterised as having lack of consistent care and 'attunement' from the primary caregiver. Lack of attunement or *synchrony* of interactions patterns between carer and infant are said to change the structure of the developing brain (Hoffer, 1987). Schore (2001) identified the right part of the brain and limbic system as linked to affect (emotional) regulation, and stress modulation. Changes in these regions, are said to be identifiable for example through brain imaging work. Such findings have alerted professionals of the need for early identification and intervention. Attachment Theory itself has been prominent and in recent years, has received increasing focus among educational psychologists.

2.5. Developmental Difficulties

This section looks at the area of Developmental Difficulties. Developmental difficulties, or 'disorders' is a term that refers to a cluster of problems related to atypical brain development. These include areas linked to Literacy learning (Dyslexia); Mathematics learning (Dyscalculia), and neurological-related conditions or issues such as Autistic Spectrum Disorder and Attention Deficit Hyperactivity Disorder (ADHD) (Frederickson & Cline, 2009). The two areas of

Literacy and Mathematics learning will be the topics of focus in the following sections.

2.5.1. Literacy

The capacity for language has been said to be unique to the human mind, and linked to academic achievement and attainment (Frederickson & Cline, 2009). Brain research has claimed to identify areas of the brain that are relevant to the acquisition of specific types of literacy skills, such as the reading of words, contrasting with such learning processes as the recognition of sounds.

Goswami (2004) points out that the ability to recognise and manipulate sounds is localised to a specific part of the brain. The interesting implication for this is that learners whose language mainly relies on letter-sound correspondences rather than the recognition of whole words may experience greater difficulty in learning. Such research is relevant to an understanding of the developmental difficulty, termed 'dyslexia'. Dyslexia has been the focus of attention in numerous educational psychology publications (notably for example, *DECP Working Party Report*, 1999) and has been central to some of the remediation and intervention strategies that have been used by educational psychologists.

Neuroscience research has claimed to settle some of the debates about whether dyslexia was primarily a problem related to visual processing or the processing of sound. Rumsey et al (1992), for example demonstrated a particular lack of activity in a part of the brain[4] responsible for phonological processing where there was reduced activity in the case of dyslexic pupils (reduction in activity indicating lack of use of phonological skills). This seemed to support the previously held belief that dyslexia was a problem related to phonological rather than visual processing.

Brain imaging techniques has also said to illustrate the benefits of targetted intervention for dyslexic children (Simos et al., 2000). As an outcome of successful remediation, Simos et al (2000) observed patterns of activity, carried out through brain imaging work, resembling those of children without reading

4 Tempo-Parietal Cortex

difficulties. This seems to suggest that specific types of strategies, which are linked to findings and outcomes of brain studies, would be particularly effective for helping individuals with dyslexia.

2.5.2. Mathematics

Numerical ability has also been seen as an academically valued skill (Butterworth, 1999). The ability to swiftly and accurately recall number has been linked to educational progress (Butterworth, 1999). Numeracy has however received less attention in both education and educational psychology literature than literacy.

Neuroscience has identified a concept called 'number sense' or the symbolic representation of quantity as an important foundation for mathematics. Cantlon et al (2006) used functional magnetic resonance imaging (fMRI), a neuro-imaging technique, with adults and four year old children, to investigate whether there is an early-developing neural basis for abstract numerical processing. An area known as the *intraparietal sulcus* (IPS) was identified as corresponding to the processing of numbers.

> *'As a child learns to count, the sense of number integrates with the early ability to exactly represent small numbers. This is then said to form the foundation of more detailed understanding of number'.* (DfES, 2001, p. 2).

Of relevance to educational psychologists is that some learners are characterised by specific difficulties understanding number concepts, lacking a sense of number and quantity, and have problems learning number facts and procedures, and such skills have been linked to the developing brain. These individuals have been termed 'dyscalculic'. The Department for Education and Skills have defined the maths difficulty, termed dyscalculia as:

> *A condition that affects the ability to acquire arithmetical skills…Dyscalculia learners may have difficulty understanding simple number concepts, lack an intuitive grasp of numbers and have problems learning number facts and procedures. Even if they produce a correct answer or use a correct method, they may do so mechanically and without confidence.* (DfES, 2001, p. 2)

Wilson et al (2001), have used insights from brain science to develop an educational intervention for children with mathematics difficulty. For example, the researchers used the concept of 'number sense' to develop a computerised programme, which used individualised teaching by constantly assessing childrens' performance and adapting the difficulty of the task. The improvements, according to Temple et al (2003), have been seen to have a neural link, which results in increase in brain activity in areas that were originally underactivated (Temple et al., 2003). As assessment and intervention are seen as central to educational psychologists' work (DECP, 2002), the implications are that educational psychologists can be more informed about the use of such knowledge to critically evaluate such educational interventions.

2.5.3. Different Areas of Learning

Blakemore and Frith (2005) propose that one claim of neuroscience is to 'illuminate the nature of learning itself' (p. 5). Developmental changes, such as that of the early years (the further growth of brain connections and shedding between them) are also said to be a feature of adolescent development. Proliferation of cells and pruning for example are said to be particularly evident in the later changes in pre-frontal cortex, an area said to be associated with executive functions such as organization, reasoning and attention (Pennington, 1996). Such areas reinforce the idea that the brain develops in progressive stages from lower-order function to those governing higher order functions (Hall, 2004). Educational psychology publications, (for example, Dawson & Guare, 2004) have focused on the development of executive function in young people and suggest interventions for learners who have difficulties in such areas.

The review of research has briefly highlighted some areas of potential relevance to educational psychology, specifically in the areas of literacy and mathematics. In an attempt to highlight the relevance of brain science to educational psychologists, Goswami (2004) puts forward the point that:

> *….Educational and cognitive psychologists need to take the initiative, and think 'outside the box' about how current*

> *neuroscience techniques can help to answer outstanding educational questions* (p. 2).

Goswami's assertion that educational and cognitive educational psychologists 'need to take the initiative', and 'think outside the box' seems to suggest that some level of creativity is needed with how neuroscience can be used to answer educational questions. It has been interesting to note the author's confidence in enlisting the engagement from educational psychologists. Such a proposal also seems to be echoed in other literature. Bruer (1998), for example, sees educational psychology as a necessary interface between brain science and education. Hall (2004) states that linking brain science and education together requires at least three levels of analyses: the first is the level of the inner workings of the brain, secondly the level of psychology or cognition. Finally, the third level is the practical application of the knowledge derived from the first two levels. Hall states that, 'while attempting to link the first and second levels, it is easy to see that disciplines like social psychology or educational psychology are as close to the third level as the second' (p. 3).

However, given some of the potential relevance of neuroscience research to education, and a call for educational to participate in dialogues about neuroscience, the views of educational psychologists about the place or role of brain science in their discipline has not been considered in research. Mayer (1998) makes the point that, 'Students learning and learning takes place in their brains, so any complete theory of educational psychology needs to be consistent with relevant research in…. neuroscience' (p. 337). However, what does Mayer (1998) refer to when he uses the 'term' theory? What can be construed as educational psychologists' theory? In considering this question, the next section turns to consider the possible frameworks of practice used in educational psychology. This is in an effort to understand how the profession of educational psychology itself has constructed its role, and how compatible this role is with the area of neuroscience.

2.6. The Practice of Educational Psychology

Wolfendale (1992) in a book about the profession's practice, states notably that 'Our definitions of what educational psychology is, lies in our descriptions of what educational psychologists do' (p. 1). The emphasis in this statement seems to be that it is the actions and practices which define the discipline of educational psychology. In clarifying what the authors consider the bedrock of the profession, references are made to hypothesis-testing, a focus on situation-specific work and problem solving strategies, while 'core activities' are considered to be consultation, assessment, and one to one work with children (Sigston, 1992). Furthermore, as Wolfendale (1992) states, 'there is no obviously common and distinctive professional language or conceptual or theoretical understanding of practice frameworks…' (p.2), suggesting in a sense that educational psychologists are diverse in approaches and little coherence exists in the practices individual educational psychologists carry out.

In contrast, references to biology or medical models are noticeably little in educational psychology literature. Such a case may be, as Kelly (2008) notes, due to educational psychology's adoption of Constructionist Theory, where broader contexts and experiences of the child are the focus, than individual within-child factors. Constructionism, in Kelly's views was used to 'move forward' from the 'traditional, medical or individual deficit paradigm' that the profession had progressed from (p. 23). Matthews (2003), as well as Fox (2011) propose that EPs should be guided by knowledge and experience in their practice rather than driven by a theoretical evidence base. These circulating views in educational psychology literature may be why neuroscience, is given little focus and prominence, or at least received with uncertainty by educational psychologists.

As the central aim of this research is to seek out educational psychologists views about neuroscience, it has been important to establish firstly why such views have not been prominent. It has been suggested for example that the discourse or vocabulary of science, or of medical models, may not form part of the theoretical or conceptual models used by educational psychologists (Byrnes and Fox, 1998). However, parallel with this is also the argument that there is no

specific or coherent set of conceptual or theoretical frameworks that strictly govern the work of educational psychologists. Fox (2011) has also endorsed a practice-based evidence model, which positions educational psychologists as practitioner-researchers, rather than those who rely exclusively on evidence to inform practice. While many influential frameworks are endorsed, such as those based on social models of the child, these are presented as the antithesis of medical models, and are not seen as entirely inclusive of them. Such views perhaps begin to provide a rationale for educational psychologists' lack of engagement with the area of neuroscience.

Nonetheless, educational psychologists have been invited to participate in dialogues about neuroscience. Howard-Jones (2008), for example endorses a three step model, where the levels of science, psychology and contextual factors unite to bridge the gap between neuroscience and education. Howard-Jones suggests that the gap, particularly at the secondary level of psychology, can suitably be filled by social or educational psychologists. Given these varied claims, it has been of interest to the researcher to gather current views of educational psychologists about the role of neuroscience to their field.

Having considered the potential issues and implications of educational psychologists' engagement with neuroscience, the next section turns to some of the views and controversies that have advanced about neuroscience in current educational literature.

2.7. Neuroscience and Education: The Emergence of Divided Views

> *The relevance of 'brain science' for the classroom has proved controversial with some educators, perhaps because of distrust of the applicability of so-called 'medical models' to education. Nevertheless, the brain is the main organ of learning, and so a deeper understanding of the brain would appear highly relevant to education* (Goswami, 2004, p. 5).

In carrying out the post -1990 search, the researcher noted that there has been a general trend in education literature about neuroscience's links with education and learning. For example, journal articles begin with a clear opening statement

about the recent alignment of education and neuroscience, and how neuroscience could potentially be relevant and useful to education. However, authors then acknowledge that there has been controversy over the new connections being drawn between the two fields. Various reasons are given for this. One of them, for example, has circled around the misapplied or oversimplification of knowledge that has ensued in the process of translating neuroscience knowledge to educators, which has been highlighted briefly in the introduction to this research. Purdy (2008), for example says that following the new developments in understanding, there have been a 'rise in the popularity of educational packages and programmes which claim[ed] to be based on the latest brain research' (p. 197). In turn, such claims began to lead to questions about whether the links between neuroscience and education were appropriate and justified.

Fischer et al (2010), refer to some of the misconstrued ideas, which have entered popular discourse. Examples include the idea of *right and left-brain thinking, brain gym* and *individual learning styles*, referred to as 'distortions' of original research. Howard-Jones (2008), gives a particular illustration of the phenomenon of knowledge being oversimplified. In his editorial in an Education Journal, published in 2008, Howard-Jones makes reference to the misconstrued idea that children can be divided according to preferences in their learning styles. He refers to the oversimplified idea that each child can be understood as fitting specifically into the model of Visual, Auditory or Kineasthetic learner (VAK), according to the childrens' brains being geared towards a particular way of learning. Howard-Jones (2008) states for example, 'Even VAK probably began with a scientifically observable piece of evidence… that we exhibit individual preferences in how we learn. Somewhere along the line(s) of communication, this commonsense notion mutated into the need for children to be labelled V, A or K and for teaching styles to be differentiated accordingly'. (Howard Jones, 2008, p. 364). Howard-Jones refers to 'mutation' in reference to the gradual transformation of the original scientific 'fact' to knowledge that has been oversimplified and misused. Howard-Jones produces such evidence to put forward his cautious position that neuroscience knowledge may be useful, but can also be subject to pitfalls in understanding.

Authors have had different reactions to such misinformed ideas about neuroscience. For example, one immediate reaction was to find ways to 'build bridges' between the area of education and neuroscience. The analogy of building bridges has been referenced in a number of ways. One way could be seen as the call for a 'transdisciplinary' agenda, the idea that the union of education and neuroscience needs the cooperation and integration of other disciplines, and different areas of research to inform it. As Fischer et al (2010) state, 'creating a strong research foundation for education requires a collaborative approach with a two way dialogue in which practitioners and researchers work together to formulate research questions and methods so that they can be connected to practice and policy' (p. 68). Such connections seem to suggest that there is a need to strengthen understanding through integration between different communities, to tackle the problem of oversimplified knowledge being propogated. Dialogues between different communities would therefore facilitate the process of transferring knowledge, in its appropriate form, across disciplines.

However, of most interest to the researcher, was how such views about neuroscience began to take shape. The literature demonstrates that various 'competing claims' appear to exist, which have been put forward by authors from the field of education, scholarly and scientific communities in relation to the position neuroscience should, and potentially could occupy in education.

2.8. Sceptics and Enthusiasts

The researcher has noted a division in literature of views expressed. For example, two polarised viewpoints appear to exist, which can be construed as either *optimistic* about the integration of neuroscientific ideas to education, or in contrast, generally *dismissive* or *sceptical* about its role. Geake & Cooper (2003) have described this as two 'camps'. As they explain,

> *We are aware that many of our readers have already joined one of two diametrically opposed camps: that neuroscience should keep its nose well out of education affairs, or, that an even stronger case should be made for a future reliance of education on neuroscience* (p. 7)

Either position can subsequently give rise to a number of ways neuroscience is discussed in literature. Those who show optimism, for example, use certain language constructs such as neuroscience and education being a 'common-sense connection', or 'completing educational theory'. Goswami (2004) describes the idea that by adopting neuroscientific knowledge, education would possess a 'neural tool' (Goswami, 2004, p. 12), implying that knowledge of the brain could be used as a resource (like a 'tool') for teaching and learning. Zull (2006) further maintains the idea that learning happens simultaneously with the biological processes of the brain. He states, 'our understanding of learning must be consistent with the biological properties of that learning' (p. 8). In other words, authors of this view make allusions to the idea that neuroscience completes our understanding of teaching and learning, partly because learning and biology 'occur' simultaneously. It is therefore equally important to understand the biology as to understand the social processes of learning, if educators are to be effective in their roles.

A secondary claim arising from the 'optimistic' camp is that neuroscience can potentially transform the status of education and educators. Geake and Cooper (2003) claim that knowledge about brain science could change the status of teachers, and has the potential to empower professionals. They illustrate with a particular 'scenario' in which a teacher, during discussions with a parent, can offer her explanations about why a pupil hasn't understood math from her broad repertoires of neuroscientific knowledge. Johnson and Hallgarten (2002) are also of the view that, 'teachers must be empowered once again, to design curricular and pedagogies, because they are the best people to judge how to engage young people' (p. 12).

However, contrary to the view of neuroscience offering a precise and complete account, another view suggests that the neuroscience approach is deterministic, causal and reductionist, therefore limiting the 'knowledge' frameworks from which educationalists can draw (Bakhurst, 2008). Bakhurst puts forward the point that education is a 'communicative endeavour', and education should focus on the person. That is, education is a social activity and neuroscience is a set of internal processes that cannot explain the contextual

and interactive nature of the teaching and learning process. In response to Geake and Cooper's (2003) teacher-parent scenario, Purdy (2008) maintains, rather than to seek out 'priveleged glimpses' (p. 130) we must seek out facts that 'appear before the teacher'. In contrast, the assumptions is that there are many contextual and interrelated factors which affect learning, and a preoccupation with the brain would limit or reduce understanding about these processes. At first glance, each account seems legitimate and justified, in the context of each writer's presenting argument.

2.9. The Role of Language in Giving Views

Of interest to the researcher, that within the literature reviewed, there is the acknowledgement about role of language in the giving of views. These competing viewpoints seem to suggest the importance of the role of language in offering *justification* for the applicability of neuroscience in education. Some authors have even made reference to this link.

Bakhurst (2008), for example, makes reference to the power of 'metaphor' in conveying certain points of view about the brain. For example, in reference to a text by Blakemore & Frith (2005), he states that 'It is significant that from the very outset, their [the authors'] language is one of limits to learning, and that they portray education in terms of an engineering metaphor: education as landscaping (p. 418). Such an allusion to the metaphor is used to convey the idea that brains can be 'cultivated' to flourish and bring on the potential to learn'.

> *'the brain has evolved to educate and to be educated'; that it 'acquires and lays down information and skills'; that it learns new information and deals with it throughout life'; that it is 'our natural mechanism that places limits on learning', determining 'what can be learned, how much, and how fast', Blakemore and Frith foster the view that the real focus of education is brains, not people* (cited in Bakhurst, 2008, p. 418).

Another proponent of the neuroscience-education link also makes reference to the role of vocabulary in identifying the divide between cognition, a hypothetical mental construct, and neuroscience. Tommerdahl (2010), for example, likens the similarity with the brain and cognition as a 'figure-ground' perception image.

Tommerdahl's assertion is that the divide between the two areas is only of language and vocabulary and not about an actual separation between the two. Here, the distinction is not made between the processes, they are in effect one and the same thing – it is language that presents the dividing line between the two. While the former view, about brains being 'cultivated', constructs the brain as something that is valuable and worthy of nurturing, the other seems to allude to the inseparable nature of cognitian understanding of
one component naturally calls for understanding of the other. Finally, Blakemore & Frith (2005) talk about a 'common vocabulary' which needs to be shared between disciplines, to overcome the divide that separates brain science from education.

Such references to language appropriately connect to the central preoccupation in this research, which is to explore views about the area of neuroscience through seeking out patterns and variations in a speaker's language. How is language used to put forward certain views, and what do these views say about a speaker's position in relation to the topic of neuroscience? Furthermore, what implications do these views have on the speaker's actions and choices?

The following section will turn to literature relating to the field of discourse analysis, which has been considered as a tool for this research.

2.10. Discourse Analysis as a Tool for Research

The previous section has attempted to highlight that neuroscience, far from being a neutral and unitary term, describing essentially the study of biological phenomena, has been the object of fragmentary and contradictory references. This has usually been in relation to an author's viewpoint, position and the particular agenda in relation to a contentious topic. This seems to reinforce the idea, endorsed by discourse analysts, that language 'does things', for example 'claim, persuade and justify' (Landgridge, 2004, p. 330) in order to maintain or reinforce a particular perspective or point of view. The use of language is also embedded within disciplinary and institutional practices. For example, neuroscience as referred to by a philosopher or by an educationalist, is

different to the 'neuroscience' referred to by a scientist, offering different *conditions of possibility* for a particular object of reference.

In the current research, the researcher has considered subjecting neuroscience to a discourse analytic examination, which fundamentally explores such variations in language (Edwards & Stokoe, 2004). The sections that follow will outline the area of discourse analysis by reviewing key literature. The sections which follow will aim to provide a context for proposing discourse analysis as a method to explore the analytic focus of this thesis.

2.10.1. Understanding Discourse Analysis

Discourse analysis as a field is broad. As quite a wide definition, Taylor (2001) describes discourse analysis as the 'close study of language in use' (p. 5). Discourse analysis, became prominent in psychology due to the 'turn to language' in the 1970s. Potter and Wetherell's (1987) publication *Discourse Analysis: Beyond Attitudes and Behaviour,* was one important part of the development of the approach. Potter and Wetherell challenged the cognitive approaches in the 1970s, being used to investigate the notion of attitudes. In their book, the researchers criticised the limitations of the cognitive view of the attitude as a mental construct, residing inside the mind of people, and elicited through instruments such as rating scales or questionnaires. Potter and Wetherell (1987) referred to this as 'cognitive reductionism' in that the idea of views and attitudes were reduced to a single response on a continuum between two extremes, for example, *extreme like* to *extreme* dislike, as if people were disinterested information processors.

The authors of the book reveal the powerful position of language in human interaction. The authors upheld the view that 'it is discourse and conversation that should be the focus of study, because that is where meanings are created and negotiated' (Willig, 2008, p. 94). They also referred to the term re-specification, in support of the new 'turn to language' movement. Re-specification involves re-working psychological topics as discourse practices. Psychological topics are seen through language or discourse, leading to

different understanding about such topics. The following excerpt by Edwards and Stokoe (2004), explains the notion of re-specification:

> *Rather than having memories, thoughts, attitudes, etc., that they carry around in their heads and produce on cue, people are shown to formulate or work up the nature of events, actions, and their own accountability, through ways of talking. These 'ways of talking' are constructive and action-oriented. They are constructive in the sense that they offer a particular version of things, rather than any other. They are action-oriented in the sense that any actual version of events, being a specific one produced on cue, and for the occasion of its production, is always analysably doing something (e.g. countering, complaining, praising, justifying), and not merely being dumped from memory into talk.* (p. 500).

Edwards and Stokoes' (2004) reference to the constructive and action orientation of talk suggests in a compelling way, that talk is not neutral but has a functional quality. Discourse analysts state that people don't have straightforward views, but have a variety of ways – discursive repertoires – when speaking. As Billig (1997) states, 'When one is giving one's opinions on a matter of controversy… one is not only making a claim about one's own stance…, one is also taking a critical stance towards the counterview' (p. 43). This suggests that there is an argumentative nature of talk when giving of views. The researcher was drawn towards investigating the complex richness about giving opinions' (p. 43). The researcher's appeal towards discourse analysis as a tool for research therefore arose from its preoccupation with how opinions are put forward.

2.10.2. Forms of Discourse Analysis: Discursive Psychology

Within the discourse analytic field, there are many approaches. One of these is Discursive Psychology (DP). Discursive Psychology has been described by Edwards & Stokoe (2004), as the 'application of principles and methods from discourse and conversation analysis… to psychological themes' (p. 501). Discursive Psychology emerged from the area of linguistics, with a focus on how people negotiate meaning through language in everyday contexts, paying careful attention to non-verbal as well as textual and grammatical features of language to describe what people achieve by speaking about things in certain ways. The focus in discursive psychology is *how* language is used by speakers

to accomplish certain actions. In discursive analytic work, there is therefore often a focus on the *interactional* quality of talk between speakers.

Issues of race and gender have been areas of focus in Discursive Psychological (DP) inquiry, and have been particularly notable in the way DP can be used to analyse *views*. One pioneering example was Potter and Wetherell's (1987) exploration of views about Polynesian Immigrants. The authors carried out open ended interviews with white-middle class New Zealanders in order to gather their views about the minority immigrant group of Maoris. The authors were concerned with the action orientation of talk. For example, how in the course of speaking, did a speaker avoid the category of 'racist'? The notion of 'culture' simultaneously becomes formulated in different ways, 'involving a different cast of characters and identities' (Potter and Wetherell, 1995, p. 91). Critically in such an investigation, the focus seems to lie in the interactional sequences of talk the speakers engage in. In other words, speakers were not claiming to be racist, but *performed* the action of 'racist' through speaking about Polynesian Immigrants in a certain way. These then were revealing of how attitudes are constructed and formulated through language.

Discursive Psychological enquiry has also explored identitities, or peoples' positions in relation to specific beliefs or ideologies (Edley, 2001). These have been termed 'subject positions'. Nigel Edley's (2001) discursive analysis of men and masculinity, for example, looked at the way mens' identities have been socially and culturally constructed through discourse. Men's identities, for example, were defined by symbolic activities such as ways of moving and talking, and interests such as style of dress. Edley argues, that rather than attribute men's action to their biology, men in the discursive analytic sense, are seen to 'accomplish' the act of being men through different practices. The particular proposition of discourse analysis is that language or discourse has particular implications for the way people carry out their identities, roles and subject positions.

Of relevance to the present research is that DP has been used to carry out studies of scientific discourse as a particular field of interest. For example, Gilbert and Mulkay (1982) looked at ways in which scientists account for and

justify their own scientific views. They demonstrate notably, the presence of variability in talk and that knowledge can be continuously revised and re-constituted in the process of scientists talking and giving accounts of their research. Myers (1985) on the other hand, looked at the practice of negotiating the review of knowledge claims made on a scientific paper. In Myer's and Gilbert and Mulkays' (1982) example, a great emphasis seems to be on the nuances within the conversation itself, with little investigation into how language is embedded in the wider socio-historical discourse (for example, science). A criticism advanced at Discursive Psychology has therefore been that there is more regard of textual and grammatical features of conversations and texts, rather than commentary on the implications of the practices and actions of the people speaking.

2.10.3. Forms of Discourse Analysis: The Ideas of Foucault

During the course of this research study, the researcher also became aware of a second Discourse Analytic tradition, on which this research draws. Foucauldian Discourse Analysis (FDA), was instigated by the works of Michael Foucault (1982). Foucault was a philosopher and historian who focussed on an examination of power, in relation to a critique of institutions, disciplines and historical frameworks of knowledge (Rabinow, 1984). His work was influenced by post-structuralist ideas, which, broadly speaking, was a movement that fought against a unitary 'truth' and 'order', and critically questioned what it means to say that something is *true*. Foucault believed that what is broadly accepted by a society or group of people, became a 'regime of truth' and relate to 'truth games' being played when people speak about an object. He proposed, therefore, that there are certain *conditions of possibility* of a particular object being spoken of in a certain way and during a certain time.

In one of his seminal publications entitled, *Archaeology of Knowledge,* Foucault (1972) investigated how the human sciences could be mapped in a historical time and location. Therefore, science, to Foucault, became an 'event in the order of knowledge' (p. xi). Foucault believed that the same object can be talked

about differently in different periods in history, and statements about these objects change over time.

Arribas-Allyon and Walkerdyne (2008) state that 'technologies are practical forms of rationality for the government of self and others. Technologies of power seek to govern human conduct at a distance, while technologies of the self are techniques by which human beings seek to regulate and enhance their own conduct' (p. 99). An earlier review of some of the educational psychology frameworks and models, suggests that the profession of educational psychology has been made up of certain 'institutional' structures that are points of reference from which the profession can seek to define itself. In the course of speaking, Foucault (1982) reasoned that people speak rhetorically to uphold their particular beliefs and practices.

Foucault's own work however, was mainly focussed on historical enquiries. In *Archaeology of Knowledge* (1972), Foucault tries to 'rediscover on what basis knowledge and theory became possible, within what space order became constituted' (p. xii) Foucault particularly criticised the nature of disciplines, particularly how they had a hand in propagating certain knowledge. Knowledge to Foucault, was for example, institutionally positioned, in that it was seen to be governed by a framework of the very discipline. This then has a direct impact on the practices that are adopted within that institution or discipline. Discourses are therefore, *sites of struggle* where speakers negotiate with the conditions of possibility that are available to them in the context of their discipline.

Foucauldian analysis was therefore of interest to the research because Educational Psychology can be described as one such 'discipline' or 'institution', and thereby make available certain discourses and constructions of knowledge. However, a Foucauldian or post-structuralist approach has not been used widely in educational psychology literature.

One interesting example may be Gallagher's (2007) Foucauldian informed analysis of the conventions and frameworks that are used by educational psychologists. Gallagher describes her work as a 'counterdiscourse', (or an alternative version of the dominant discourse), in which she aims to talk back

and denaturalise the dominant discourse of educational psychology. This the author does through looking at the non-discursive aspects of the discipline, such as the 'political and social networks in which the discipline of educational psychology is embedded' (p. 62). An earlier section in this literature review referred to certain frameworks and practices which seem to influence the work of educational psychologists. Gallagher (2007) states that any discipline operates with a kind of rationality, or a set sense-making activities, which orders, organises and brings into focus a certain 'truth' about that profession. In Gallagher's view, 'the work of discourse analysis is undertaken not because discourse is seen as delivering a 'truth', a discourse is selected for analysis because its 'truth' is seen as relational, situated and partial' (p. 65).

Drawing from some of the available approaches that have been reviewed in these sections, for example looking at both the technical features of data (Gilbert and Mulkay, 1982), as in Discursive Psychology, and the principles underpinning Foucault's work, it is proposed that a fuller investigation can be applied in the present research to investigate educational psychologists' views about neuroscience.

2.11. Gathering Education Psychologists' Views in Neuroscience

Only a handful of publications refer to research gathering educational psychologists' views, and very few have focussed on an exploration into language. Of relevance to this research is Brooks et al (2003) enquiry into EPs perceptions about the importance of early intervention on long term brain injury. The findings of this study, generated essentially by means of questionnaires, was that there was consensus among EPs in the study about the need for greater support for younger children, revealing in some way an interest and level of appreciation of the phenomenon of 'acquired brain injury', and its impact on the younger brain. Interestingly, this study also referred to attrition of participants during the data gathering period, which was in part due to lack of knowledge about the phenomenon of brain injury, or in this case, 'insufficient details to make reasoned estimates' (Brooks et al, p. 53). Again the research

involved the scientific measure of responses using rating scales to acquire a sense of educational psychologists' views. This research however, required the critical assumption by EPs that 'acquired brain injury' is a somewhat broadly accepted phenomena or idea, to which a pre-existing attitude can be expressed, re-inforcing the particular cognitive reductionism that Potter & Wetherell (1987) found limiting. However, this particular approach critically overlooked the possibility that there may be other ways of construing the concept of 'brain injury', which in itself can be located in the discourse of pathology and deficit.

In the area of neuroscience, few particularly current views have emerged from the field of educational psychology. In 1998, a group of educational psychologists contributed to an issue of the Educational Psychology Review (Byrnes & Fox, 1998). Cited earlier in this review of literature, Byrnes & Fox made two claims that can either complement or challenge neuroscientific ideas. First is their proposal that the area of cognitive psychology can usefully inform and complement neuroscience. The publication was a focussed effort to draw knowledge about the brain research relevant to educational psychologists, and a number of suggestions are made as to why EPs may not engage in dialogues about the brain. They make reference to the discourse about 'reductionism', and the suggestion of some scholars that 'appealing to neurology within a psychological account tends to make one a reductionist' (p. 299). Byrnes & Fox proposes that rather than to abandon neurological terms, educational psychologists should become 'bilingual', and incorporate neuroscientific understanding in their 'explanatory vocabulary' (Byrnes & Fox, 1997, 300). It is proposed that one aim of the present research can be to seek out the current 'explanatory vocabulary' educational psychologists use and whether some of these views (for example, reductionism) have shifted.

More than a decade has elapsed since these views were expressed. Byrnes & Fox (1998) departed with the position that 'Educational Psychologists can play a key role in shaping the future direction of research in cognitive neuroscience' (p. 393). As yet, however, there has been no systematic and detailed exploration of educational psychologists' views about neuroscience.

An attempt at gathering perspectives about neuroscience was made by Pickering and Howard-Jones (2007). The researchers investigated perceptions of the role of neuroscience, particularly with regard to education which included largely feedback from teachers, and other education-related professionals. Quantitative data was gathered about educators' perspectives. Some of these related directly to definitions of neuroscience, and questions such as how educators would like neuroscience findings to inform curriculum content. While Pickering and Howard-Jones found constructive responses from teachers, such as 'knowledge of the brain is important in making decisions about how [teachers] teach but not necessarily what they teach,' (p. 18), little insight was gained about why teachers took up certain perspectives as opposed to others. The current proposal of applying discourse analysis to educational psychologists' talk offers a much more thorough and detailed picture of the language devices educational psychologists deploy to construct meaning about neuroscience in the context of education. The use of Foucauldian principles also aims to add another depth to the enquiry in trying to think of how discourse limits or enables the possibility for certain social practices.

2.12. Rationale for Research

The primary rationale for this research is to gather views from educational psychologists about neuroscience. At a secondary level, these views, seen as discourse, can be examined more thoroughly in terms of how the subject of neuroscience is constituted within language. The idea of constructions can be embedded in the 'social constructionist paradigm' (Willig, 2008). The focus is to find out what discursive practices EPs engage in and what resources educational psychologists typically deploy when expressing views about neuroscience, and how these shape their involvement around this area of knowledge. The literature review has shown the prominent views, tensions, contradictions in discourse that currently *circulate* in various texts, journals and media articles. But it becomes apparent that educational psychologists' voices have not currently prominent in these discourses. Do educational psychologists share any of the claims evident in the literature? Are there other broader discourses educational psychologist's draw on, which either obstruct or make

possible greater engagement with the area of neuroscience in their work? As such, the following questions, based on a discourse analytic formulation, will be the focus of the present research:

a) *How do educational psychologists discursively construct the role of neuroscience in their discipline?*
b) *What subject positions are warranted by these constructions?*
c) *What implications do these constructions have on the educational psychologist's practice?*

2.13. Chapter Summary

This chapter has aimed to highlight firstly why neuroscience may be important to the discipline of educational psychology by reviewing research that may be proposed as relevant. The Chapter has also visited some of the frameworks and models that educational psychologists use in their practice to consider the potential role neuroscience may carry within these models. The Chapter has also looked at the different debates about neuroscience particularly in educational publications. It has been noted that such debates have been made up of different views. In addition, language has been the key medium through which such views have been expressed. The Literature Review then looked at discourse analysis as a tool for the present research. Two approaches of discourse analysis were introduced, namely the Discursive Psychological approach, and Foucauldian Discourse Analysis. Research that has been investigated by these approaches, particularly in relation to giving views, have been highlighted. It was noted that there is a particular lack of enquiry into gathering educational psychologists' views through the medium of discourse analysis. This lead to the aims of this research, which will be to gather educational psychologists' views about neuroscience through a discourse analytic examination. The research questions were finally highlighted. The next section will look at the methodology that has been used for this research.

3. Chapter Three: Methodology

3.1. Overview of Chapter

The last chapter offered an overview of the literature about neuroscience and described some of the possible links proposed between neuroscience and educational psychology. It then discussed the rationale for the current research. This chapter refers to the broad orientation of this research, and the epistemology it is placed within. The chapter highlights discourse analysis as the methodology to be used, and specific analytic methods used in Discursive Psychology and the ideas of Foucault, as discussed in Chapter 2, as frameworks for the data analysis. The research will firstly re-visit the research questions (3.2), after which an outline of the research paradigm and design will be provided (3.3). This will follow a description of the participant sample of this research (3.4). Details relating to instruments, including piloting them, and the procedure for gathering information, including ethical considerations (3.5 – 3.8), will be highlighted. Following this, the procedure for data analysis (3.9) will be introduced and criteria for judging the quality of the research (3.10). Finally, issues relating to reflexivity and the role of the researcher will be considered (3.11). A chapter summary will conclude this chapter (3.12).

3.2. Overall Aims of Research and Research Questions

As highlighted in Chapter Two, neuroscience is a particularly new area which is not strongly embedded in the discourse of educational psychologists (EP) (Byrnes and Fox, 1998). This research therefore aims to gather views of educational psychologists about neuroscience through an analysis of their discursive constructions (Potter and Wetherell, 1995). The research utilises methods available from within the discourse analytic tradition to seek out how educational psychologists talk about the topic of neuroscience. The research questions developed were therefore the following:

a) *How do educational psychologists discursively construct the role of neuroscience in their discipline?*
b) *What subject positions are warranted by these constructions?*

c) *What implications do these constructions have on the educational psychologist's practice?*

This chapter will provide details about the selected methods and approaches which aim to gather the most relevant data to best answer these research questions.

3.3. Research Paradigms and Design

A paradigm is a way of viewing the world; it is linked to 'certain philosophical assumptions that guide and direct thinking and action' (Mertens, 2005, p.7). The three areas of ontology, epistemology and methodology make up a philosophical paradigm (Lincoln & Guba, 2000). An ontological question asks what constitutes the reality of the human being in the world (Denzin & Lincoln, 2005, p.183). An epistemological question is related to 'how we gain knowledge of what we know' (Creswell & Plano Clark, 2007, p.23) and a methodological question seeks to establish the actual process of research and how the researcher goes about acquiring the relevant and desired knowledge.

3.3.1. A Qualitative Research Paradigm

This research is embedded in the qualitative research paradigm. Qualitative research is concerned with meaning-making, and an exploration into contexts (Hayes, 1997). This approach removes the tendency for prediction and control on the part of the researcher, as in the quantitative approach, and relies on the way participants generate meaning about a topic. In qualitative work, the researcher's role may be to facilitate dialogue or provide opportunities for participants to offer their versions and accounts of a particular object of study. The present research will be using an exploratory approach to look at the variation of language and meanings participants ascribe to the topic of neuroscience.

3.3.2. Social Constructionist Position

Within qualitative research, a dominant perspective is social constructionism. Social constructionism refers to the view that topics, ideas and phenomena in the world are socially constructed, rather than a direct reflection of 'reality' (Willig, 2008). Social constructionism challenges the view that language simply 'mirrors reality'. Ideas are instead *constructed*, or 'brought into being' by the way we talk about or refer to them. The outcome is that methods used within this paradigm will invite data about a topic which is shifting and multiple (Potter and Wetherell, 1987). That is, there will be little consistency and uniformity in the type of responses expressed by participants, and the views will be subject to change. Social constructionism views the person as a 'socially-constructed, situated and contingent identity' (Hollway et al, 2007, p. 37), who has gathered distinct repertoires of meanings about a topic (due to culture or social influences over time), and the research process attempts to uncover such meanings. The object of analysis in social constructionist research is typically language, and language is also the central medium through which meanings are expressed.

This research uses a social constructionist paradigm to explore different ways educational psychologists talk about neuroscience. Consistent with this approach, speakers will be seen as offering 'discursive constructions' or *versions* of what may account for the term 'neuroscience' (Edwards and Stokoe, 2004). As an extension of the literature that has been reviewed, references to the term neuroscience may be 'contradictory', 'inconsistent' and 'negotiable' (Edwards and Stokoe (2004, p. 502), revealing the type of variability the chosen method of discourse analysis typically seeks out. These constructions will also give rise to 'subject positions' (discussed in Chapter Two), where speakers will take up certain identities from which they speak. Finally discourse analysis has also looked at social practices. In other words, as identities are socially constructed, individuals will typically speak from within the available meanings that circulate in their social world.

The next section considers how participants were selected for this research.

3.4. Participants and Sampling

The researcher was informed by the discourse analytic methodology when considering the participant sample for this study. Langdridge (2004), for example, makes reference to the preference for discourse analysts of sampling a small number of participants due to the breadth of analysis needed in discourse analytic work. Potter and Wetherell (1987) have identified as few as one participant where the interview data can be analysed with thoroughness and detail. However, up to ten participants have been referred to as appropriate by Langdridge (2004), in order to capture the variability of responses that are possible by a group of individuals. As Coyle (2006) states, 'What is important is that sufficient discourse is gathered in order to discern the variety of discursive forms that are commonly used when speaking of or writing about the research topic' (p. 247). Following reading of the various methods of analysis possible for discourse, and taking into account suggestions for sample size (for example, Langdridge, 2004), the researcher commenced the process of recruitment based on the intended quota of ten participants.

The principle criterion for inclusion of participants was that the participants were educational psychologists. To gather educational psychologists for the study, the researcher began contact with Local Authority services which were within close geographical proximity to the researcher's location of residence. How representative the sample would be was mainly determined by the variability of views participants could provide. Mainly from reference to literature, for example, Kelly (2008) and Mackay (2002), the researcher was of the view that there would be sufficient variability between EP services, and moreso between educational psychologists themselves to reflect the range of views sufficient for the discourse analytic work intended. As Coyle (2006) importantly notes, variability also occurs 'within the individual's discourse' (p. 249). The concern for discourse analytic work is in terms of the formulations that are created by participants when they talk, so as long as the criteria of educational psychologist was fulfilled, the final sample seemed adequately representative for the purposes of the discourse analytic examination proposed.

Decisions about method of recruitment were mainly through considering how interest in taking part in the research could be generated. The researcher first contacted the Principal educational psychologists (PEP) of two services, with an e-mail outlining the title of the research, its aims, and a request for the involvement of EPs. A package was also sent by post to the two services, with a covering letter to gain the maximum possible awareness and interest. This package contained:

1. a covering letter outlining the aims of the research, and the researcher's wish to carry out interviews with EPs about the area of neuroscience. The letter stated that the Principal would be contacted by phone in a week after receipt of the letter to discuss whether they would agree to their service taking part, (please see Appendix C, for the letter to the educational psychology service);

2. a participant information sheet, which outlined the process of the research, ethics and contact details of the university, (please see Appendix D);

3. a sample consent form for participants (contained in Appendix E) and;

4. a Sentence Completion Task, consisting of 3 sentence stems (please see Appendix F for this task). Section 3.5.1 gives a description of this task.

This initial method of contact, however, only lead to a mere three educational psychologists taking interest in the research. Among these only two were willing to take part in formal interviews. Due to such a small response, the researcher considered other ways of recruitment. Meanwhile, the two initial participants gained for the research were valuably used to carry out pilot work, in relation to the development of an interview schedule. (Please see Section 3.5.4, *Pilot Study*).

The researcher contacted a further three educational psychology services, first by e-mail to alert PEP's about the researcher's interest in recruitment of participants, again outlining the main aims of the research. While one PEP

chose for their service not to participate (mainly due to time constraints), the further two expressed interest. Following low responses initially, the researcher discussed opportunities to explain and present the research to EPs in the services. Both PEPs stated that this opportunity would best be met during an EPS professional meeting, where all EPs of the service would be present.

To recruit participants for the research, the researcher carried out a brief talk during the EPS service meeting, where the researcher highlighted the topic of research, and the researcher's interesting in gathering EP views about neuroscience. Appendix G gives an outline of the main points covered during this meeting). After the presentation, all EPs at the meeting were asked to complete a Sentence Completion Task, consisting of three sentence stems; these asked them to provide their views about neuroscience. This was one instrument for gathering data and is described in more detail in Section 3.6.1. The rationale for the sentence completion activity was so that some preliminary data could be gathered. At the end of this task, a question on the sheet asked whether EPs would agree to take part in a further 45 minute interview with the researcher to explore their views further.

A total of ten EPs from both services ultimately agreed to take part in the interview stage of the research. The EPs consisted of 2 Trainees (TEP), 2 Assistant Principal educational psychologists (Asst PEP), 2 Locum EPs, and 4 main-grade educational psychologists. The following table gives a brief profile of the final sample of participants, giving information about gender, length of experience as an EP, and their role within the service. A column also highlights their stated interest or specialism as drawn from the interview data. Pseudonyms have also been provided of the participants for anonymity, and these will be referred to in the Analysis of interviews in Chapter Four.

Table 1: Background Information of EPs included in the interviews

EP	Gender	Length of Experience as EPs	Role	Area of Specialism /Interest	Pseudonym
1	F	2	MG EP	Social Justice	[Marion]
2	F	17	MG EP	Looked After Children	[Elsa]
3	M	Trainee EP(Yr 3)		MLD/Complex Needs	[Phil]
4	F	35	Asst PEP	Casework	[Lorna]
5	M	33	Locum	Strategic/Systemic	[Rob]
6	F	Trainee (Yr 2)		Looked After Children /Attachment	[Nora]
7	M	33	Asst PEP	Neuropsychology	[Martin]
8	F	6	MG EP	MLD/Adolescent Mental Health	[Rene]
9	M	35	Locum	Trauma following Accidents	[Bill]
10	F	18	MG EP	Classroom Dynamics	[Paula]

Key: MG EP – Maingrade Educational Psychologist; Asst PEP – Assistant Principal Educational Psychologist; MLD – Multiple Learning Needs.

3.5. Instruments for Gathering Data

The instruments used for this research were designed to gather EPs' talk, otherwise known as 'discourse'. Discourse has been defined as both 'spoken and written communication' (Landgridge, 2004, p. 323). In discourse analysis these communications or utterances are expressed typically in relation to a discursive object. The discursive object in this case is the term 'neuroscience'. The instruments used to gather data would therefore provide opportunities for participants to respond to the discursive object, 'neuroscience'. Two instruments that have been used for this purpose is the Sentence Completion Task and the Semi-Structured Interview.

3.5.1. Sentence Completion Task

A Sentence Completion Task can be described as a free response measure (Soley & Smith, 2008). Sentence completion tasks require the participant to complete sentence "stems" with their own words, in as much detail as they wish. Responses to such a task are considered to give a projection of

participants' conscious and/or unconscious views. The researcher was mainly interested in gathering the spontaneity of views that the task generated. They were therefore completed immediately after the researcher's presentation so that views given on the task would require little thought and deliberation. The full task accompanying an explanatory sheet can be viewed in Appendix F. The most critical rationale for spontaneous completion of the task, was so that EP views were not influenced by learned material or acquiring further knowledge about neuroscience, which would otherwise be possible if time elapsed before the task was completed. The purpose of the task was then to assist the process of developing a semi-structured interview schedule (Please see 3.5.2). Appendix H provides an example of a completed sentence completion activity.

3.5.2. Semi-structured interviews

The use of interviews in qualitative research has been described as a 'construction site of knowledge' (KVale, 1996, p. 2), and allows the researcher to hear participants' points of views and opinions in their own words. This section briefly considers why interviews have been considered as a data gathering tool for this study.

Interviews have been identified as one of many forms of data gathering techniques in discourse analytic work. The form of data gathering in discourse analysis has been dependent on whether the researcher is more interested in the *topic*, or the *interaction* between speakers. Occasions in which the researcher is interested in analysing the quality of interactions between speakers, there has been an interest in the use of naturally occurring talk. Naturally occurring talk refers to 'informal conversation which would have occurred even it was not being observed or recorded, and which was unaffected by the presence of the observer and/or the recording instrument' (Taylor, 2001, p. 27). These types of talk are contrasted with more structured interview situations. In the interview situation, the researcher attempts to initiate talk which focuses on a specific topic, usually working with a prepared list of question or discussion topics. Ultimately, the researcher's interest lay mainly in how neuroscience is talked about by educational psychologists, rather than a

great focus on the interactional quality between interviewer and interviewee. The researcher intended to provide an occasion where speakers negotiate meaning, views and opinions about the topic of neuroscience. The medium by which they do this is through devices in language. As Kvale (1996) importantly notes, 'it is the structures of language that speaks through the person' (p. 43). For this purpose, interviews seemed an adequate and relevant data gathering tool for the present research.

Interviews can be carried out with groups or individuals. Group interviews, also termed focus groups, were initially considered. However, focus group interviews present the possibility of individual views being influenced by other members of the group, thereby potentially having a transformational quality. The researcher was more interested in how independent views *took shape* in the course of speaking, by each participant, without being influenced by the views of others.

Semi-structured interviews were ultimately considered most appropriate for this research, and formed the main basis of data collection. Semi structured interviews offer the opportunity for exploration of a particular topic, but also allows some flexibility in the way questions are asked (Cohen, Manion & Morrison, 2007). Semi-structured interviews offer the opportunity for interesting or novel avenues to be explored by having a set of pre-formed questions, as well as provide opportunity for the researcher to asked further questions (Smith, 1995). Therefore, the exact sequence of questions does not need to be followed for every participant, and not every question needs to be asked (Smith, 1995).

In further reference to discourse analytic interviewing, Potter & Wetherell (1987) state that interviews 'provide an occasion where a relatively standard range of topics can be explored with each participants' (p. 84). They make reference to a 'schedule of questions', but where the art is to 'keep to the schedule enough to ensure each topic is dealt with by each participant, but at the same time, letting the conversation flow and following up interesting lines of talk as they happen' (Potter & Wetherell, 1987 p. 84).

The researcher went through a process of developing the interview schedule. This involved some piloting (please see Section below, headed Pilot Study 3.5.4). As neuroscience was a relatively novel area in EP discourse, the research considered different ways of engaging EPs, and also considered possible ways of eliciting valuable data. Creating a Sentence Completion Task (itself a tool to gather discourse), allowed both the participants to reflect on their views, and to prepare an occasion to share these during the interview. The interview was distinct from the first data gathering tool, the Sentence Completion Activity, in that the participant already had a set of views as a benchmark for exploration. The researcher found it useful, for example, to draw on the specific 'terms' and 'descriptions' of the participant to formulate questions and explore meanings. The interview process was then highly reflexive, allowing participants to explain and justify their views without the use of leading questions, or presumptions being made on the part of the researcher. This was important as there was no knowledge pre-requisite for participants to taking part in interviews, as was made clear during the researcher's presentation. (Appendix H provides a sample of a completed sentence completion task, and annotations demonstrating how specific terms and phrases from the Sentence Completion Activity have been used to formulate interview questions). The idea was to construct a schedule that was very much related to the initial views given. As Breakwell (2006), states, an appropriate interview schedule, 'takes the respondent through what appears to be a set of issues which are sensibly related' (p. 232).

The researcher therefore, considered ways of orienting the participant to the particular interview approach. This firstly involved asking about the participants' early training and work as an EP. The researcher then posed the question about what brought them to this particular interview about neuroscience. Therefore, the participant was prompted to consider connections between their work as an EP, and how neuroscience could potentially be related (or unrelated). Following these questions, the researcher felt it critical to explore participants' responses as given on the sentence completion activity. Certain terms and phrases were explored which made reference to the term 'neuroscience'. The interview questions were therefore very much related or contingent on the participants' own responses. Finally, a reflexive section was

built into the interview schedule where the researcher provided an opportunity for debriefing and clarifying understanding about the interview. Appendix I contains the interview schedule, together with the researcher's rationale about why certain questions were chosen.

3.5.3. Role of Researcher

In discourse analytic interviewing, the researcher is very much part of the research process, and the interview is as much about self-discovery and reflexivity throughout this process for participant and researcher (Landgridge, 2004). The researcher also contributes to the flow of the discourse, making it more a conversation between the participant and researcher. This then leads to a range of interpretive resources (as both researcher and participant contribute to the conversation) and a set of arguments develop which start to reveal a participant's views and perspectives. The reflexive component of the interview greatly enabled this process.

3.5.4. Pilot Study

The purpose of the pilot work for this research was principally to consider two main areas. The first was to consider methods for recruiting participants; the second, to consider what interview protocols would be suited to answer the research questions.

According to Tiejlingen and Hundley (2001), pilot studies are intended to 'give advance warning about where the main research project could fail, where research protocols may not be followed, or whether proposed methods or instruments are inappropriate or too complicated' (p.15). The two areas of focus for the pilot work are described below:

Method for recruiting participants

The initial research proposal submitted by the researcher stated that the method for recruiting participants would involve the researcher contacting the Principals (PEP) of Educational Psychology services by e-mail, requesting involvement from EPs to take part in the research. As stated in the Section 3.4 *Participants and Sampling*, this included a formal letter describing the aims of research, and information sheet with researcher's details and a sentence completion activity. The letter gave brief instructions for completion of the *Sentence Completion Task*, and the PEP was requested to forward the task to as many EPs interested in completing this.

As stated, this method was first tried at two EPS', to see how many EPs expressed interest. The degree of interest in participating would determine, for example, if the e-mail contact method would continue or an alternative method of recruitment should be explored. Due to limited respondents, the researcher reflected on the method of recruiting participants. Few responses, for example, may have been an indication of lack of interest in the topic area. For example, only EPs that were interested or had knowledge about the topic of neuroscience were likely to reply. This was, for example, the case in Brooks et al (2003) study where there was limited responses due to individuals' self-perceptions about lack of knowledge about neuroscientific ideas. Byrnes and Fox (1998) also refer to 'unfamiliarity' or 'indifference' among educational psychologists about neuroscientific issues. As an outcome of informal discussions with EPs and reading of such literature, the researcher felt that EPs would be reluctant or reticent about giving their views about the area of neuroscience. One assumption EPs may have held for example, was that the research required EPs to demonstrate understanding about neuroscience, rather than give views. This also had implications for the participant sample: that is, only EPs who were willing to demonstrate knowledge or were familiar with the area were likely to agree to interviews. To reflect a broad range of EP views, the researcher considered different ways of recruiting participants for the research.

The service presentation was seen as an opportunity to engage EPs about the area of neuroscience. Such an approach was used to highlight the importance

of the variation of *views* circulating in the education field about neuroscience and how educational psychologists were being called to respond to this. It was intended that such an approach would incite interest in EPs to give their views. (An outline of the presentation is provided in Appendix G).

The interview schedule

The researcher considered the possibility that participation would be based on initial interest and knowledge, and this would lead to a bias in the data gathered. While the sampling bias was tackled by addressing a broad range of EPs (as stated above), the interview schedule also had to ensure that participant responses were an authentic reflection of their views, and was not influenced by leading questions.

A total of two pilot interviews were carried out. For these interviews, the participants did *not* complete a prior Sentence Completion Task. Instead, the researcher prepared a semi-structured schedule of questions. Using this process, the researcher noted that there was a general loss of fluidity during the interview. It was felt that the participants were not given an opportunity to consider or *prepare* for the process of giving their views. The free-response approach (where participants were given the sentence stems) ultimately aided the participants' expectancy and provided a framework for the interview process. Appendix I provides the schedule of questions ultimately adopted. The schedule also includes annotations of the researcher's decisions about the questions selected. The next section considers ethics.

3.6. Ethical Considerations

This research adhered to the British Psychological Society Code Conduct and Ethics (BPS, 2006), and Ethical Principles for Conducting Research with Human Participants (BPS, 2009). It also complied with the University of East London Code of Good Practice in Research (2004). This research was approved by an ethics committee based at the University of East London (Please see Appendix J for completed Ethics Approval Form). The following

provides a summary of ethical considerations that were relevant to the research.

3.6.1. Informed Consent

All participants who were involved either in contributing to the research, both those offering their written views during the Sentence Completion Task, or those offering their views through an interview discussion were asked to provide 'informed consent' for their participation. This consent would be based on a briefing of the research aims and objectives as outlined during the researcher's presentation. The Participant Information Sheet, which provides information about the research, ethics and researcher's contact details, can be viewed in Appendix D).

3.6.2. Withdrawal

At the outset of the study, the Information Sheet made clear all participants' right to withdraw at any time before or during the data gathering stage.

3.6.3. Anonymity and Confidentiality

The BPS ethical principles stipulate all data obtained about participants must be kept confidential unless otherwise agreed in advance. Only participants who signed consent forms were known by name and referred to during the interview process. However, participants were informed that their names would not be used in transcripts or on any part of the thesis document.

3.7. Procedure

The participant selection and sampling have been described earlier in this Chapter. This involved explaining how contact was made with Principals of two educational psychology services local to the researcher. The process of

describing the aims and rationale of the research to EPs during two EPS professional meeting was highlighted. This lead to recruitment of ten educational psychologists for the purpose of semi-structured interviews. The process of piloting interviews has been outlined and ethical considerations highlighted. The following section explains how data was gathered and analysed.

During the telephone conversation with the first PEP, the researcher explained the instruments which would be used to gather then data, for example the Sentence Completion Activity, which would be the first stage of gathering the data, followed by the 45 minute interview, the second stage. The PEP suggested dates to the researcher by e-mail. Two dates were finalised between the researcher and the PEP, and the researcher arranged to visit the service on the agreed date and carry out a ten minute presentation.

The data gathering was in two stages. These were as follows:

Stage One : The aim of the stage was to gather initial data from all educational psychologists. This was in the form of written responses to the three sentence completion tasks. Responses to these were used to help generate the first stages of an interview schedule. Appendix H outlines how, for example, how specific words and phrases were highlighted, so that these could be explored further during interviews. At the end of the presentation, Sentence Completion Tasks were distributed to all EPs, together with participant consent forms. All EPs completed participant consent forms (Appendix E). The researcher then left the room and allowed EPs the time to complete the task. At the end of the Sentence Completion Task, respondents were asked if they would be willing to take part in an interview to explore their views further. If they agreed, they were asked to give their contact details, and sign the bottom of the Sentence Completion Task. All respondents who did not sign remained anonymous. Participants who agreed to take part in the interview were then contacted within a week of doing the presentation, so that a time could be arranged to carry out interviews.

Stage Two:

This was the formal interview stage. The researcher visited EPs at their respective services to carry out interviews. A quiet room was arranged in for all interviews by the EP.

3.7.1. Data Analysis

The following Section describes the steps of data analysis. The section will begin by discussing the topic of discourse, followed by the method of discourse analysis that will be used to analyse the interview data that was generated from a discussion with ten educational psychologists. Approaches from discourse analytic traditions, that is, Discursive Psychology (DP) and Foucauldian Discourse Analysis (DP) will be discussed as tools for the research.

What is Discourse?

Discourse can be defined as 'all spoken and written communication', and so discourse analysis is concerned with the 'analysing communicative utterances' of these kinds (Langdridge, 2004 p. 323). Discourse analysis involves considering 'how specific words, descriptions and accounts are assembled and put to work' (Edwards, 2007, p. 42)

According to the discourse analytic approach, language or discourse creates multiple versions of understanding an object. It is normally seen in contrast to the 'positivist' view of the world as one in which language simply reflects a material truth. As Pidgeon and Henwoods' (1997) explain, 'it is knowledge [of our world] which defines (i.e. constructs) how objects in the world are presented' (p. 246). As shown in some of the debates presented in the Literature Review section of this thesis, neuroscience can be 'understood' in a number of ways, giving rise to varied views and perspectives (for example, viewing neuroscience with optimism leads to claims about neuroscience 'completing' or giving a 'fuller' account of educational theory). As Landgridge (2004) explains, a concept, such as neuroscience, 'does not simply define the world as it is, 'but serves to impose a particular way of seeing the world' (p. 324) Discourse analysis is a method by which the 'constructions', 'versions', or 'accounts' people give can be explored in detail. Based on these broad

definitions, a specific set of tools have been developed to make sense of peoples' utterances in relation to the discursive object of study. The tools and techniques from two discourse analytic traditions will be used, namely the use of micro-level analysis, as in the case of Discursive Psychology and approaches based on Michael Foucault (1982).

Traditionally, Discursive Psychology and Foucaludian discourse analysis represented divergent fields to investigate distinct and separate questions. However, researchers proposed the integration of the two approaches for a more thorough analysis of discourse (for example, Landgridge, 2004 and Willig, 2008). The two approaches are explained below:

3.7.2. Discursive Psychological Approaches

The Discursive Psychological (DP) approach was visited in Chapter Two. However, this section will highlight the main features of DP that will be relevant for this analysis. DP looks at the interactional features of discourse, and applies a micro-level of analysis. Micro-level refers to certain technical and grammatical structures of language which are the subject of analysis. DP provides a set of analytical tools which have been adopted for this research. The method focuses on highlighting some of the interactional qualities of a conversation (in the case of this research, being the participant and interviewee). The approach concerns an investigation of the specific language features that are deployed by speaker in order to put forward certain positions and contentions towards an object discussed. Some of the features of language that will be under investigation are rhetorical devices, formation of categories, interpretive repertoires and ideological dilemmas. These are described as follows:

- Rhetorical devices – micro level analyses such as DP, are typically concerned with the argumentative nature of talk. Billig (1991) highlighted that people construct different versions of the world to counteract or challenge alternative versions to put forward their views. This involved detecting instances when a speaker attempts to use language as a persuasive device to put forward a particular position or contention. For example, a view may be put forward with an alternative position in mind.

- Formation of categories. As Potter and Wetherell (1987) maintain, categories, 'are nouns from which we construct versions of the collectivities in which we live. In a sense, they are the building blocks of our many versions of the social world; however, once we look closely at the blocks, we see that they themselves are not solid and defined, but have to be moulded in discourse for use in different accounts' (Potter and Wetherell, 1987, p. 137). An application of categories to discourse about neuroscience may be that the term is linked with certain institutions and groups of people, eg the medical profession or psychiatrists, rather than teachers or educators. Again, these categories may be deployed by speakers to achieve certain ends and put forward certain positions.

- Interpretive repertoires can be described as 'basically a lexicon or register of terms and metaphors drawn upon to characterise and evaluate' an object of discourse. Interpretive repertoires have been referred to as clusters of terms, organised around a certain metaphor (Edley, 2001); (Potter and Wetherell, 1987). Interpretive repertoires seek out such aspects of language as commonplaces, jargon and similes – certain claims are made using these language constructs which fulfil a speaker's 'agenda'. For instance, the construct, 'neuroscience as myth' may be regarded as a 'disclaimer', in that it may not fit with the 'real world' issues with which the educational psychologists work. The educational psychologist may have (in other parts of the discourse) reveal what constitutes their work, which they justify as real and pragmatic decisions which must be made to solve 'real world' problems, thus challenging the 'myth' construct. Such a construct can be thought of as an interpretive repertoire. These involve terms or common-places which circulate within social or institutional language, and are common to that language.

- Ideological dilemmas can be seen as instances when a speaker contradicts their own comment or assertion about the object of analysis. One example of this would be the two competing claims, drawn from the above example: neuroscience as myth as opposed to neuroscience as

fact. Potter & Wetherell (1987) refer to this as an ideological dilemma, a contradiction, a situation in which an object of discussion can be construed in two different ways. It is based on the assumption that speakers can express competing claims about the same object of analysis. In reference to this, Billig (1991) highlights the argumentative nature of talk in which people construct versions of the world which are used to counter alternative versions. So, this tool assumes that an EP's view or attitude towards neuroscience will be produced with an alternative position in mind. For example acceptance of neuroscience as a legitimate area of interest in contrast to rejection of it as a valid and legitimate area.

Ideological dilemmas also illustrate the variability in discourse, which can be used to describe views.

Other linguistic features applicable to DP, includes the use of *variability, stake* and *accountability* (Potter & Wetherell, 1995). Stake refers to the vested interest that speakers express when putting forward views. Speakers may also discount the value of a position or view so that their own is given more importance (Mulkay & Gilbert, 1982). Analysis of these linguistic features will be applicable to how educational psychologists discursively construct views about neuroscience.

3.7.3. Using the Principles and Approaches of Foucault

Having outlined some of the linguistic features of the text itself, how can we then make comments about the speakers' views as a whole? For example, what does analysis of repertoires of language say about the speaker's position? What implications do these have for the speaker's actions and choices? The researcher's interest in offer a broader response to the research questions, lead to an interest in analysing language use at the macro-level. This focuses on the 'text as a whole'.

Foucault saw his ideas as providing a tool-box for analysis: 'I would like my books to be a kind of tool-box which others can rummage through to find a tool

which they can use however they wish in their own area' (Foucault, 1994, cited in O'Farrell, 2005, p. 50). Foucault was concerned with how ways of talking about an object, event or experience are located in institutional contexts and in the disciplinary practices of groups of people (referred to as the extra-discursive features of discourse). In the course of speaking, respondents may show how privileged discourses are given importance or are *legitimated*, and how various subject positions and actions are made possible by discursive constructions (Willig, 2008).

Foucauldian approaches involve considering the broader disciplinary and institutional practices which govern a discipline or group of people. In Chapter Two, the researcher highlighted Foucault's preoccupation with the processes of power and knowledge. The language individuals use are inextricably bound up, for example, with their social action. For example, while some discourses enable or facilitate a certain course of action, others limit or suppress it. Foucauldian discourse analysis has been selected for the second stage of data analysis specifically because the approach asks questions about the relationship between discourse and how people think or feel (subjectivity), what they may do (practices) and the material conditions within which such experiences may take place. Foucault asks how language is deployed to achieve things and how it creates subject positions, and what implications these positions have on practice (Willig, 2008).

3.8. A Combination of the Two Analytical Tools

The distinction between the two approaches set out above focus on, 'what people do with their talk and writing (discourse resources), typically investigated by DP, and the sorts of resources that people draw on in the course of those practices (discursive practices)', typically investigated by FDA (Potter and Wetherell, 1995, p. 81).

The researcher's interest in integrating the two approaches arose from the interest to seek a deeper analysis into the ideological issues presented in the discourse. While, for example *rhetorical* language or interpretive repertoires are being used by the speaker, what do these formulations suggest about the

broader practices of the educational psychologist? Is the profession governed by a certain set of beliefs, practices and notions which are regulating, enabling or limiting these discursive actions and choices? The researcher's interest was to give a broader commentary on the profession rather than simply look at the interplay of language at a micro level. As Langdridge (2004) states 'discourse supports institutions and produce power relations' (p. 342). In doing so, it is expected that some political or ideological positions will be presented in the discourses of EPs.

One important consideration in this research is whether there is a focus on coming to some kind of common understanding about neuroscience or whether there is more interest in the individualistic nature of findings. Discourse analytic work, which follows a social constructionist position, emerged in a sense as a challenge to positivist research, which attempts to make accurate predictions about knowledge. In the words of Taylor (2001), 'knowledge obtained from this kind of research is generalisable to other contexts because it is universal' (p. 11). It is also said to be free from the opinions and values of the researcher. On the other hand, research that is based on the social constructionist paradigm, discussed earlier, takes less taken for granted notions about knowledge and instead sees knowledge as situated and variable. Therefore, views expressed about a particular object or topic will be equally situated and multiple.

This research has essentially begun from the standpoint that in responding to questions about neuroscience, 'no neutral single truth is possible because these involve the study of other people who have their own viewpoints' (Taylor, 2001, p. 11). Therefore, this research has a greater interest in the individuality of meaning generated from participants' talk rather than commonality among them. This, in turn, reflects the situated, relative and subjective nature of meaning, and not an objective knowledge that is applicable across situations and contexts, as more typical in a more positivist position. This has been an important point to consider during the analysis of findings and when discussing them.

The analysis broadly follows the Foucauldian Discourse Analytic process as outlined in Willig (2008). Discursive Psychological approaches

(looking at the micro-level features of talk) will be drawn upon throughout the analytic process. The analytic process is described in Section 3.9.

Willig (2008), sets out six stages of Foucauldian analysis. These take account of discursive resources used in a text and a subject position they contain. An important feature of Foucauldian discourses analysis is that it not only explores constructs and peoples' positions around these constructs, but how these positions and constructs 'open up or close down opportunities for action'. See Stage 5 below. Therefore, the approach has implications for 'practice', in a sense seeing discourse as performative (of action).

Table 2: Phases of Foucauldian Discourse Analysis (adapted from Willig, 2008, p.110)

Key Questions	**Corresponding Analytic Stage**
How is the discursive object constructed through language? What kind of object is being constructed?	**Stage 1:** Discursive Constructions
What discourses are drawn upon? What is their relationship to one another?	**Stage 2**: Discourses
What do the constructions achieve? What is gained from deploying them here? What are their functions? What is the author/speaker doing here?	**Stage 3:** Action Orientation
What subject positions are being made available by these constructions?	**Stage 4:** Positionings
What possibilities are mapped out by these constructions? What can be said and done from within these constructions? What can be said and done from within these subject positions?	**Stage 5:** Practice
What can potentially be felt, thought and experienced from the available subject positions?	**Stage 6:** Subjectivity.

In summary then, this research adopted a twin focus, by looking at both the technical features of talk, as well as a broader focus on the social practices that are shaped by language. As Landgridge (2004) states, 'While a focus on discursive practice helps us to understand why speakers construct or negotiate meaning, a focus on discursive resources helps to answer questions about why speakers draw on certain repertoires and not others'.

3.9. The Analytical Process

Initial Coding

A large amount of data was generated from the interview process, and analysis involved carefully selecting texts and passages which corresponded to stages of Foucauldian Discourse Analysis (Willig, 2008). For example, the researcher coded for instances when Discursive Constructions were being presented, corresponding to the Stage 1 of Foucauldian Analysis outlined above. This involved the search for both explicit references and implicit references. For example, direct references to the term neuroscience and associated words, ie. 'brain' or 'nervous system' were highlighted. However, other references were also noted, e.g. reference to hospitals or clinics may suggest that neuroscience, in the speaker's view, is linked to certain institutions and practices. Coding was done as inclusively as possible, the then researcher looked for patterns in the text, and selected a range of extracts which had a common thread or connection. These in the researcher's view, exemplified when a particular construction was being drawn on in relation to the research question. The full analytic steps are provided below.

Transcription

Discourse Analysis typically uses a system developed by Gail Jefferson (2004), which focuses on the finer (grammatical and technical) details of texts, including use of emphasis and length of pauses. In discourse analytic transcription, there is also recognition of non-verbal features of communication. The reason for discourse analysts' thorough application of transcription symbols is to denote the specific qualities and processes of the *interaction* between speakers. As stated earlier, this research was less interested in interaction, than the speakers' views about the object of neuroscience itself. Therefore, decisions had to be made about how far the traditional Jeffersonian classification was necessary to be able to carry out a meaningful analysis that is also relevant to the research enquiry.

Wetherell (1998), has for example, used a modified version of the Jeffersonian system when combining a post-structuralist and conversational analytic based

study on the constructions of men's identities. The aim in the study was to look at some of the features of the sequences of talk, however, not overshadow the macro-level meanings generated in the analysis. In the present research, as there was less focus on the *interactional sequences* of talk between speakers, a similarly modified version of the Jeffersonian system was used. Notations that were useful, such as rise and fall in intonation, pauses and emphases were considered valuable and retained. For example, where Jeffersonian notations such as underscoring and upper case letters were used, these represented language used emphatically, and may have been used to reinforce a particular view. Notations that were less relevant to the study, such as interruptions (as there were only two speakers) and physical/bodily gestures were ommited, as they were seen as less relevant to the focus of enquiry. As the researcher was also interested in macro-level analyses, decisions were also based on the ease and readability of transcripts (Malson, 1998). The list of transcription symbols used in the transcripts have been provided in Appendix K for reference.

Analytic Steps

In the following sections, the researcher outlines the analytic steps followed in carrying out the analysis of interviews of ten educational psychologists. The analytic steps will broadly follow Willig's (2008) abridged version of Foucauldian Discourse Analysis. It will focus broadly on discursive practices (macro-level analysis), but also comment on the discursive resources of the speakers (micro-level analysis). That is, by commenting on *how* the speaker developed arguments and put forward various points.

Pre-Analysis Process

Although the interview was tape recorded, the researcher jotted down key points during interviews that she wished to revisit at the end of the interview with the speaker. The intention here was to cross-check the meanings of the key points elicited during the debriefing process at the end of the interview. This was the stage of reflexive discussion with the participant. Please see Appendix I for the Interview Schedule. Such discussion helped the researcher prepare for the analytic process, in that some of the key 'constructions' that the researcher

became aware of in the discussion became a focus for further exploration during analysis.

Step 1

During this stage, the interview transcripts were produced. The process of reading and becoming familiar with the transcripts was aided by stage one when the researcher had already clarified the meanings of certain terms and references. These were read and re-read until the contents became more and more familiar. Such re-reading facilitated the task of seeking out constructions and subject positions as required in the FDA approach.

Appendix L provides an interview transcript which gives an example of how transcripts were annotated. This step also involved carrying out the main task of a discourse analysis, searching for *constructions*. As set out in Willig (2008), seeking out discursive constructions 'involves the identification of the different ways in which the discursive object is constructed in the text' (p. 114). The Interview transcript highlights how the term neuroscience was constructed. The researcher first underlined some key 'constructions'. The researcher began to search for what constructions were interconnected to other parts of the text, or were supported by extracts within the interview and in this way were representative of and comprised constructions of 'neuroscience'. Specific extracts were considered in terms of how they might or might not exemplify the key construction. Although many examples can be highlighted in the transcript, Lines 50 and 67, give two examples of how neuroscience is constructed. In the case of the Speaker Elsa, neuroscience is associated with the 'medical model', and 'also adds power and force to a recommendation'. Therefore constructions could be composed of one word, or a specific phrase that is used to construct the term neuroscience. See annotated transcript for examples of constructions noted.

Such constructions were written in list format. These were used to later consider interconnections between them, and produce an analytic process chart (See Appendix M). This chart demonstrates how each stage of FDA is connected with the subsequent stages. Arrows indicate how early stages are connected to subsequent parts of the analysis. For example, constructions lead to a

consideration of possible *discourses* in the text, constituting Stage 2 of the analysis.

Step 2

Consistent with the second stage of FDA as outlined in Willig (2008), the second step involved identification of possible discourses. These were based on the researcher's identification of key arguments or ideologies that underpin some of the constructions identified. For example, the 'medical model' construction is linked to the discourse of biomedicine. If linked to the construction of 'power and force', this may add to a broader discourse of how neuroscience may contribute to professional integrity. The analytic process chart shows how constructions helped generate or could be *located* within a broader discourse.

Step 3

Step 3 in the analytic process corresponds to the *action orientation of texts*. This step asks questions about how language was used in the interview to achieve certain ends by speakers. This step lends itself to a more discursive psychological analysis, and DP tools and approaches may be applicable here. For example, certain phrases, or *interpretative repertoires* are used by the speaker in the sample transcript and commentary is made by the researcher about what function they may serve in the context of the interview. Highlighting and annotations were made in the transcript in relation to this stage of the analysis. In Line 93, for example, speaker, Elsa, uses the phrase 'shuts off routes' to describe a kind of abrupt closure to other possible aspects of knowledge that EPs may find relevant to their work. It is perhaps deployed by the speaker to justify *why* it is important to be 'sceptical' (Line 93). Again, the process of finding the action orientation of the texts involves analysing what function certain words, phrases and grammatical features of the text serves.

Step 4

This is the stage where the research searches for subject positions, consistent with Stage 4 of FDA. Subject positions can be thought of as identities that are brought into being when people formulate constructions. The research question focussed on what subject positions are enabled by different constructions of

neuroscience. Therefore, this stage of the analysis was quite critical to the research focus. One subject position may be, the EP professional identity is based on integrity, and others' reliance on them for guidance and advice. This is consistent with the early construct of neuroscience as offering 'power and force to a recommendation'. In other areas of the transcript, the speaker also talk about beliefs, 'we believe in things'. This builds a particular subject position of an individual who holds particular values and beliefs.

Step 5

Step 5 perhaps constitutes quite a critical step in the analysis so far. The researcher looked for how certain behaviours or actions were made possible through the constructions, discourses and subject positions deployed by the speaker. This is a commentary on how the earlier analysis of discourse directly limit or make possible the educational psychologists' action and practices. Again, it is critical that the references and quotes that have been made evident so far are considered in this stage of the analysis. For example, constructing neuroscience in the context of 'more medical model' suggests that such a 'model' is different to those used by EPs. Yet, at a time when EPs want to use an additional explanatory framework, this 'medical model' will be used by the EP to add power and force to a recommendation. The subject position deployed by the speaker also suggests that the EP is likely to draw on certain 'beliefs' to guide their practices. Rejection of certain models, such as theoretical ones, as opposed to practical models, are made references to and these also have implications for the types of knowledge that is favoured and adopted in the practice of this EP. During this stage therefore, the researcher has become critically involved with the text.

Step 6

At this stage the researcher began to establish some coherence in the analysis through choosing and contrasting specific extracts which demonstrated key constructions, and linking them together in a way which attempted to provide a narrative 'telling the story'. The researcher also began writing up the analysis, drawing upon collated sets of extracts to elaborate key constructions and demonstrate their effects. As part of this final step, the researcher looked to draw together the analysis of each speaker into a broader, overarching theme, or discursive site.

The term *discursive site* is derived from critical theory. It originally describes a circle of readers sharing a common framework of language, understanding and problematic (Brooke, 2008). What is understood by the term discursive site is that there is a multiplicity of references made to the same discursive object. For example, the term neuroscience can be constructed in different ways by different speakers, and the central theme is captured through the researcher's identification of a discursive site.

Discursive sites have often been expressed in discourse analytic research as a set of similes or metaphors, to capture a broad ideology or view held by speakers. For example, in Potter and Wetherell's (1987) study about culture, the authors stated that culture can be viewed in two different ways by the speakers he interviewed. For example, Potter and Wetherell illustrate the dichotomous constructions of :

Culture as history versus
Culture as heritage.

In the study about peoples' constructions of culture, two different ways of referring to the same discursive object were identified. The *Culture as History* site culminated from references to culture as a part of a past existence which no longer resonated in the lives of people in the present day. On the other hand, the *Culture as Heritage* site, saw culture as ever-present in the practices of people and something that contributed to peoples' identities.

In one further example, Billig (1991), in a study about how people talk about the Royal Family, makes reference to two different accounts of the notion of history. The idea of 'history as national decline' versus 'history as national progress' contrasts history as a 'decay from past standards' with a second narration in which people are seen to lead freer and more materially better lives in the present day in comparison to their past ancestors.

The discourse analyst on each occasion, has taken a developing argument of the speaker, and identified a theme that is common to that argument. The question has been what epitomises or is *unique* to the particular speakers' views about a topic. This gives the transcript of each speaker a distinct and individual quality. The discursive site also drew together the main features of the analysis, and taken together, the ten discursive sites expose the variation in

the way neuroscience is constructed, and reinforce how different uses of language shape the views of each speaker.

The analytic process chart demonstrates how each stage of the Foucauldian Discourse Analysis was carried out. The flow chart demonstrates interconnections between each stage, and how these are supported by evidence/quotes from the transcript. Following this, the chart shows how numerous quotes from the text can be used to lead to the development of the discursive site.

Analysis was carried out in a creative way, unifying the main set of constructions drawn, and points highlighted in transcripts so that they formed an integrated whole. The key issue was to ensure that the list of stages highlighted in the analytic process chart and the accompanying quotes were central to the analysis. So long as these key links were emphasised and highlighted, the analysis was considered fulfilling the research aims.

Finally, the decision to stop analysing was driven by time constraints and that what had been produced seemed coherent, useful and answered the research questions.

3.10. Considering the Quality of Research

3.10.1. Validity and Reflexive Validity

Validity refers to the extent to which we can ensure that our data addresses the question we want to answer, or researches what we think we are researching (Willig, 2008).

This research has been concerned with how educational psychologists discursively construct the role of neuroscience in their discipline.

The exploratory nature of this research is such that it allows for variation of responses from participants. The researcher anticipated that many outcomes

are possible in participants' responses to the research questions. Therefore, the data that is produced by participants can appear conflicting and contradictory. This may also lead to varied interpretations to be attributed to the data during the data analysis phase. A critical friend, not affiliated with the research, was asked to cross-check the conclusions the researcher has drawn about the data (Miles & Huberman, 1994). Due to the complicated process, the cross-checking was necessary to ensure the reliability of the process followed, and that analysis can facilitate any future replication.

For the process of cross-checking, it was important that some key terminology was understood by the inter-rater, and there was an agreement about the purpose of the analytic tools. The inter-rater was first made familiar with the six Foucauldian steps of analysis, most importantly an understanding about constructions, subject positions and their implications for practice. Useful explanatory notes, sample analyses and descriptions can be found in Willig (2008, pp. 112-124). Specific discursive psychological terminology was also described. The inter-rater was guided by notes from Wiggins and Potter (1998). Terminology included the concept of interpretative repertoires (described as essentially 'metaphors', jargon or tropes used by the speaker). The inter-rater was also asked to consider how and why rhetoric would be used and what it meant for a speaker to speak rhetorically.

The inter-rater was first asked to code for 'discursive constructions'. That is, select some terms or phrases that are used in a synonymous way with the term 'neuroscience' in the transcription. These were first highlighted and the inter-rater was asked to generate a list of the constructions identified, together with subject positions.

The constructions and subject positions generated by the inter-rater was then matched with that of the researcher. From this point, the rater was asked to consider what or central arguments were being presented by the speaker. Did these have a political, social significance in the context of the passage? Overall, much data was generated from the inter-rater, and the researcher identified any similarities in constructions and subject positions identified.

Another validity issue in a qualitative approach may be transparency. This refers to how clear a process is set up in research. It is anticipated that each participant will give their initial views on the free-response Sentence Completion Task. This will be used to generate some questions to ask during the interviewing, and provide a 'sense' of the types of views the participants are likely to extend during the interviewing stage. This may ensure that each participant is therefore giving first-hand accounts of their views.

The reflexive nature of the interview can also help tackle this issue. Participants were continuously asked to clarify the meaning of their responses, and also give their thoughts about the process at the end of the interview.

A final validity consideration is reflexivity. Willig (2008), defines this as ensuring 'that the research process as a whole is scrutinized…., and the researcher continuously reviews his or her own role in the research' (p. 16). Qualitative research involves an interpretation of the research data, which suggests that the types of interpretations drawn are justified in terms of the aims and questions of the research. The discourse analytic framework allows for certain 'sections' to be selected from the full transcript that are relevant to the research question. These factors would also require a level of reflexivity.

3.11. Reflexivity and the Role of the Researcher

Reflexivity, according to Cohen, Manion and Morrison (2007), acknowledges that researchers are part of the social world in which their research takes place, and their research will be subject to their own interpretations. Throughout the research process, the researcher has been engaged and curious about the approaches taken and the data elicited. The researcher remained mindful that pre-formed ideas about EP responses during interviews was possible. The free-response task at the outset greatly enabled the researcher to explore terms and concepts from a stance of curiosity, and remained an important tool for this purpose.

Built into the interview schedule was also an opportunity for participant and researcher to make meaning of the interview process. One reason was the need to diffuse the power issues in discourse – claims of having neuroscience knowledge greater than that of participants. This issue is related to Hollway's et als' (2007) idea about power relations in discourse. For example, participants during the study admitted to not having full knowledge about the area of neuroscience and feeling 'uncomfortable' about the perceived expectations to provide knowledge rather than views. This lead to the view that researcher possessed more power (ie more knowledge of the area of neuroscience). From the pilot work, the Researcher reflected on how this issue could be tackled, in order to elicit views that were as authentic as possible. Admitting a stance of curiosity during the presentation to EPs, admitting to lack of researchers own knowledge about neuroscience were ways that appeared to diffuse these pre-conceptions. Providing a set of orienting statements (Please see Appendix K: Interview Schedule). The researcher noted from the pilot work, that a more fluid conversation-like process was evident during interviews when these factors were considered.

3.12. Chapter Summary

This chapter aimed to provide an overview of the methodology for this thesis, and included a rationale for the chosen steps of data collection and analysis. It began with presenting research questions and setting this within the context of the study and the research paradigm. Details of participants were provided followed by information relating to the procedure, instruments and role of the researcher for supporting data collection. Ethical issues were also highlighted. Discourse analysis, a method for analysing data, was described followed by issues relating to assessing the quality of research. Finally the area of reflexivity was discussed. The next chapter will present the findings of the research.

4. Chapter Four: Presentation of Findings

4.1. Introduction

In this chapter, the researcher carries out an analysis of the interview data drawn from ten educational psychologists (EPs) using tools from the Discursive Psychological approach (DA) (Edwards and Potter, 1992) and Foucauldian Discourse Analytic (FDA) approaches (Arribas-Ayllon & Walkerdine, 2008). DA and FDA have been discussed in Chapters Two and Three and will be used as frameworks for analysis. The analysis examines how a group of educational psychologists, construct neuroscience through their talk, what contentions and arguments are presented in these constructions and what subject positions these constructions create. The analysis will also aim to find out how EP constructions about neuroscience enable or limit actions and social practice. This chapter will revisit the research questions (4.1), followed by sections 4.3.2-4.3.11, in which interview data will be analysed. This chapter will conclude with an overall summary of the main findings.

4.2. Research Questions

The purpose of the analysis in this chapter is to answer the research questions:

- *How do educational psychologists discursively construct the role of neuroscience in their discipline?*
- *What subject positions are warranted by these constructions?*
- *What implications do these constructions have on the educational psychologist's practice?*

4.3. A Presentation of Educational Psychologists Constructions of Neuroscience

4.3.1. Discursive Constructions: An Overview

The first stage of the analytic process was to seek out discursive constructions. In other words, how is the term neuroscience being constructed by the

educational psychologist? This stage involved the identification of different references to the discursive object, *neuroscience*. At the initial stages of the interview, participants were invited to give their views about neuroscience, and in accordance with their responses on the sentence completion, this often involved some level of definition for the term.

As examples of the varied constructions that were provided, an initial over overview will be given here.

The educational psychologists' constructions firstly followed the convention of giving formal definitions. Neuroscience was described as 'brain connections', (referring perhaps to synaptic organisation), and 'brain imaging techniques'; One speaker referred to neuroscience being linked to 'fine, small scale work', and 'very complicated'. In other references, it is referred to as 'physiological evidence' for 'deficit' or 'pathology' in an individual. When asked from where such references were derived, a respondent replied, 'putting bits and pieces together, just from my own knowledge'. Broadly speaking therefore, neuroscience was linked to physiology and activity of the brain. The references therefore drew on the biological and the organic, structural features of the brain made available by scientific discourse.

There were also attempts at making interpretive links and drawing on more abstract concepts. For instance, one speaker described the term as underlying psychological functioning. Again, these links would seem to be more hypothetical and interpretive, but suggests that there was more abstraction or interpretation being applied to the term.

Other references to neuroscience involved an evaluation of the importance of its role in learning and the educational psychology discipline. For example, it was 'Something that helped an EP face the 'greatest challenges'; this was linked to the complexity of cases referred for educational psychologist involvement.

There was also the presence of some broad and general views, suggesting optimism, hope and relevance of neuroscience to the field to educational psychology.

As can be seen from this initial overview, accounts became more interpretive and evaluative. However, the point of divergence in these early examples from these early references, was when EPs began to put forward certain opinions. Sometimes these were rhetorically expressed and exposed the variability and complexity of language used, as is the case typically with discourse data (Potter and Wetherell, 1987). Through the DP approach, the researcher was able to look at the processes by which speakers came to put forward their assertions. The technicalities of talk were therefore an interesting point of focus.

Analysis of Individual Interviews

The following sections offer excerpts from the original interview material drawn from discussion with ten educational psychologists. The researcher carried out an analysis of talk by each individual EP, selecting some key statements from each interview. The decision to analyse the data from each participant, rather than make a more collective analysis, was mainly as an outcome of comments from EPs during the interviews, such as, 'I can't speak for all EPs'; 'very hard to answer that in terms of EPs generally' (Marion: Line 148). This suggested that there was not necessarily a 'shared belief' about the views being given, and dealing with each individual interview would lead to more authenticity in analysis.

From initial coding, 'discursive sites' as discussed in Chapter 4, *Analytic Steps,* were identified, which seemed to account well for the main pattern of constructions identified by each speaker. The next sections will report and discuss the outcomes of the analysis in the context of each 'discursive site': These represent the central argument being presented by respondents. It is acknowledged of course, that there was much more complexity in the data, and reducing it to a single discursive site would not capture the variability of the interviewees talk. However, the construction is given as an organising tool for analysis, and highlights the pattern of arguments developing in the case of each individual speaker. Please note that excerpts of interview transcripts will be provided. Within these, the italicised quotes represent the speaker's questions, while non-italicised quotes represent the responses by the participant.

The analysis commences with analysis of the first speaker, Marion, and the discursive site identified as 'Neuroscience Challenging the Social Constructionist Worldview'

4.3.2. 'Neuroscience as Challenging the Social Constructionist Worldview'

Interview with 'Marion'

In this interview selected for analysis, the first speaker, Marion, offers a broad and varied set of views about neuroscience, ranging from optimism and caution to instances of apprehension about the incorporation of neuroscience in her discipline. The analysis will show how the speaker arrives at, favours, dismisses and sometimes disclaims the role of neuroscience (in her discipline) through a range of discursive practices, but ultimately attempting to put forward the values of a social constructionist position.

In her first references to neuroscience, Marion states that neuroscience is 'interesting, 'current' and 'popular', suggesting that neuroscience is appealing, and there is awareness of the subject of neuroscience circulating as a piece of knowledge in the public domain.

Excerpt 1

> …I thought it was um .a very interesting area of research and something that is very current and I think neuroscience is going to become more and more popular and hopefully used in educational psychology (Lines 7-9)

In this introductory stage of the interview, Marion suggests that she is 'hopeful' that it [neuroscience] will be 'used' more in educational psychology. This positions Marion as generally optimistic about the place of neuroscience in educational psychology.

Later, however, Marion begins to re-adjust her reference to the area of neuroscience being 'popular' and 'current' knowledge, and begins to formulate counter-discourses. She offers a contrastive picture, stating for example, that it is a 'specialist area' (Line 35), and 'requires knowledge' (Line 72). In reference to her early studies in psychology she refers to neuroscience as 'A smallish part… like a module'. (Line 19). These seem to offer two divided constructions. The first shows Marion as being welcoming of neuroscience becoming a component of her practice, the topic of neuroscience being current and available knowledge; the second begins to show a more narrowed construction, in that neuroscience is more exclusive: a 'specialism', and as she states in Line 35, 'not a specialist area of mine'. Later, Marion admits that having come from a background of a 'drama teacher', thoughts of studying the 'structure and function of the brain were actually quite scary to me'. The reference to change in profession suggests the challenge or fear of facing a new field. It also shows the implicit link Marion makes between neuroscience and psychology (that is, moving from being a teacher to studies in psychology, which is then associated with studies about the brain).

In the following excerpts, there is a sense that Marion's views are manufactured through 'other views'.

Excerpt 2

> …We understand a bit about the structure of the brain, but I am not really sure we understand how it works.
>
> *When you say 'we', who do you mean, others, or yourself as EP?*
>
> I think by 'we', I mean the people out there researching themselves. I have been to some interesting lectures by somebody, I can't remember his full name, but his first name is Paul and he was a teacher and is now a neuroscientist and he very much talked about how much we discover about the brain the more we realise we don't know very much about it.. so I have taken on board the idea that it is (1.2) very very complex and that we are only sort scratching the surface of what there is to know, we are in the

> early days of understanding ↓I think how the brain really functions and how it really works (Lines, 49-61).

In the above excerpt, Marion is asked to clarify what is meant by her reference to ‘we’ when saying that knowledge is developing amongst an [unspecified] group of people. The reference to ‘people out there’ or researchers, seem to be a construed as (separate) representative body for the propagation of neuroscientific knowledge, not necessarily an educational psychologist. Marion also admits that she has taken ‘on board’ the view that the brain is ‘very very complex’, suggesting a kind passive acceptance of Paul’s (the neuroscientist’s) comment. The brain, and the subject matter of neuroscience in this last construct is almost unknown and distant to Marion, because her opinions are filtered through the views of another more ‘qualified’ voice (Paul).

Marion has already created a set of subject positions, of herself and in relation to a more knowledgable ‘other’, and to the subject matter of neuroscience. She firstly relates her early experiences of psychology, for example, as a new area of study. By identifying Paul, she continues to put forward certain rhetorical ‘distance’ from neuroscientific knowledge, in that she ‘has taken on board’ what he claimed, without questioning the speaker’s viewpoint.

Later in the interview, Marion states, ‘I have never really considered myself as a scientist’ (Line 32)…. Instead she states, ’I would consider myself to be a social psychologist’ (Line 65). Marion states that she has ‘layers of expertise in social psychology .. I am passionate about social justice… (repeating this category of social to perhaps give emphasis to her view)‘… when it starts going into cognitive, what I consider to be the hard science, I am interested, but I am aware that my depth of knowledge is not huge in those areas’ (Lines 69-71).

These early references perhaps facilitate the pathway for Marion to maintain a particular counter-position in the discourse, now putting forward a more contentious position; For example, she has already stated that ‘the brain is very, very complex’ and unknowable’,..Iam not a scientist. The next excerpt seems to take more of a rhetorical turn.

Excerpt 3

> As an EP I have got some quite deep reservations about (.) how we use things like, for example, the British Ability Scales or other cognitive tests and we make kind of make fairly sweeping judgements about children based on those things without, for me, taking enough account of the social context and the social situation (74-77)

As evident in her early reference to cognition as 'hard science', Marion seems to implicitly link neuroscience to cognition. The reference is made, for example, about cognitive tests, and the British Ability Scales (assessments of cognition), being contrastive to 'social context' 'social psychology and social processes'. Excerpt 4 begins to reveal Marion's broader worldview.

Excerpt 4

> I am worried about people like (*laughs*) Simon Baron-Cohen and he talks about the extreme male brain and his work and I think obviously some of his work is really excellent and useful but he is taking a small amount of evidence and making a lot of social judgements and I am concerned that is pushing us as a social psychologist. I feel that people are taking little bits of evidence and making that justification for their own unconscious social belief like there is a big difference between boys and girls which I would feel that there can be a >big difference between boys and girls but I would also say that a lot of it is socially constructed< so I am less ↓inclined to believe the biological differences and I guess that is what worries me. (115- 124)

Marion carefully formulates her viewpoint to finally arrive at her central argument. In this excerpt, Marion simultaneously praises and criticises Baron-Cohen, being tentative about justifying her viewpoint in a cautious, balanced manner, 'some of his work is excellent'; on the other hand, 'I am concerned that he is pushing us like a social psychologist'. Marion also appears to question the seemingly accepted belief by Baron Cohen that there are 'biological differences between males and females (Line 67). Furthermore, the use of the term, 'unconscious belief', also seems to perhaps imply 'unthoughtful', a further

attempt at undermining Baron Cohen's particular position or view. Marion subtly rejects the notion of biological bases of gender differences, endorsing the view that people become 'gendered' as they grow up in society: 'they are socially constructed'.

Marion's expression of 'worry' at two instances in this excerpt says something about her subjectivity. This seems to reinforce the idea that for Marion the take-up of neuroscience is delimmatic (Edley, 2001, p. 203) and tension-provoking. It conflicts with her broad worldview of social constructionism. Later she also admits that she is a 'feminist' (Line 137). Consistent with this, gender is not rooted in biology or biological discourse, but an identity created by society, and this line of argument is presented poses some restrictions of the acceptance of neuroscience as an acceptable knowledge framework. The analysis shows the limits and borders of Marion's acceptance of neuroscience, and therefore implications of her practice.

This analysis of the first speaker seems to be reflected in Potter and Wetherell's (1987) assertion about subject positions, in that, 'the motive force behind the dominance of some self-constructions is people's desire for voice, or speaking rights, their wish to have their interpretation of events prevail against competing versions. The self is thus articulated in discourse in ways that will maximise one's warrant or claim to be heard.' (p. 108). In turn this has implications for the boundaries and limits of Marion's social actions. For example, the accounts show how some social constructionist views are particularly dilemmatic for taking up neuroscience as an acceptable framework of knowledge, and (consistent with the particular construction, of social constructionism/ feminism) aspects of neuroscience may not be integrated into Marion's theoretical frameworks as an EP. This initial analysis is illustrative of the six stages of FDA, in that, constructions and their implications for the subsequent discursive resources of the participant is gradually made evident.

4.3.3. 'Neuroscience as 'Another' Explanatory Model'

Interview with Rob

In the following interview, the speaker, Rob's constructions of neuroscience contribute to the gradual formulation of 'another explanatory model' (for EP work) (Wolfendale, 1992). Unlike Marion, neuroscience is not just an area of knowledge linked to cognition, but also a possibility among other possibilities of knowledge that could and sometimes *should* be utilised in EP work. In building this particular construct, the speaker also creates the subject position of EP as professionally eclectic ('eclectic' being one of his own terms; Line 180). This particular position or identity also becomes apparent by some further discursive choices that Rob makes during the course of the interview.

Rob firstly constructs neuroscience as a different perspective (Line 83), and distinct from the other areas of knowledge that EPs typically engage in. This suggestion is given in Line 66, when Rob states that it is a 'slightly different angle'.

Excerpt 5

> …actually look at the view of the profession I think that (1.5) neuroscience can be very informative for the profession and I think it seems to me coming at it at from a slightly different angle which I think hopefully will be very rewarding and very stimulating (Lines 87-90).

As with the first interview, Rob also talks about the dominance of social constructionism in EP work in the following excerpt. However, there is also the suggestion that this is one of many frameworks EPs use and may change as a function of time and changing trends.

> I think that often the model tends very much to be based on sort of social constructionism and looking at the socialisation and social processes and I think that a view that… whats raining these days is promoting that type of model, that the view that I have got, perhaps maybe mistakenly but I think that social context is the flavour of the month in EP work

> and the model of sort of consultation you know people like Patsy Wagner sort promoting social psychological models and theories really to the exclusion of all others and my view would be that we need to be ECLECTIC in our view really and I think we need to take account importantly of social functioning, social psychology but also I think looking at more experimental psychological methods and where it is appropriate neuroscience as well. (177-187).

Rob refers to the term, 'model', which is perhaps in reference to a framework of practice applied by EPs (for example Kelly et al, 2008). Foucault (1992) would regard a framework as something used to order and organise knowledge within a discipline. Rob's reference to 'that type of model', or one model 'at the exclusion of all others', suggests that there may be other models that are known and drawn on by EPs. His metaphorical reference to social 'models' as 'raining these days', and being the 'flavour of the month' is euphemistic, and also a notable example of an interpretive repertoire, in that they seem to be transient ('days'.. 'months') rather than static frameworks that EPs draw on. Rob also questions his own views. '…view I have got… probably mistakenly… ' we need to be eclectic' creates an uncertainty about this speaker's position. However, from his previous references to 'different angle' and 'doing something different' may suggest that Rob is self-questioning and open to different possibilities. In Line 220, Rob's reference to EPs as 'free spirits' may further re-affirm this position. Lastly, although the term neuroscience is not referred to explicitly in this reference, Rob's reference to 'experimental psychology' and appropriate neuroscience seems to be implied as the antithesis of the social 'model' he refers to earlier.

Rob's position becomes apparent through interesting but indirect channels. In an early part of the interview, Rob positions himself as a (younger) student who was 'directed towards science' due to the trend followed in his family. He then speaks of an interest in geography, because of its focus around 'populations and people'. He speaks about looking out for a subject with a 'softer side', and something with a social basis.

Excerpt 6

> ..I studied science A levels, in school I was directed towards science because my family all worked in scientific fields and I really wanted to study geography but I wasn't able to do that because of the options in school so that was probably an area, a discipline that I wanted to study further but I was denied that and then when I came to choose what subjects I wanted to do at university I felt that I didn't have the interest in the pure sciences to take further >I was looking for something< that had more of a social basis to it and there was a bit of a softer side and I think that is where my interest in geography and populations and people (Lines 7-15).

The emphasis of the term 'denied', in the above extract suggests that there was some regret at not having the opportunity to follow his interest in geography. The interview explored Rob's early practices as a psychologist. Rob talks in the following excerpt about the appeal of 'Working at a strategic, systemic level' (Line 38). This seemed to him more 'interesting and exciting' than carrying out assessments, which were seen as less stimulating work (the work of less qualified 'assistants').

Excerpt 7

> I was geared up to working in group work at a systemic level and the reason for that was a lot of the other on the course was spending time practising bog standard assessments whereas we had done that as assistant EP's in services that the thing that we had been doing so they felt that we didn't need to sort of do that or look at that in any detail so it was quite an innovative model and very stimulating and thought provoking. (Lines 37-43)

In the following extract, speaker Rob also gives an account of a case reported in the *Psychologist* magazine. Rob draws on the notion of 'evidence' to illustrate the importance that he will give to neuroscience on the condition that the evidence is strong and compelling. Evidence to Rob is what 'people will take seriously'. *The Psychologist* may be perceived by Rob as reputable publication, and hence used to state the validity of the report, and something to be taken seriously.

Excerpt 8

> I think it is (1.2) evidence that people will take seriously there was a case reported in the Psychologist about a woman who was convicted in Italy of murdering her sister and there was brain imaging techniques undertaken which showed that she had some specific difficulties and specific problems that were leading her to behave in a violent way and this lead to a minor reduction in her sentence which shows that if courts of law are starting take that into account when they make sentences I think it shows it is (.) insightful in a way in that offering explanations of why things might happen. I mean I was surprised by that, it wasn't a detailed account it was quite a brief reporting of the case but I thought it was quite significant really (Lines 142-152).

In this extract, some graphic phrases are elicited by Rob and the perpetrator is seen as 'convicted', 'murdering', 'violent'. The use of the term 'specific' also seems to extend the construction of 'serious'. Rob also makes a point of stating that it was a 'brief' account, but significant enough to accept the neuroscientific findings on which it was based. Therefore, if neuroscience can justify, explain and 'be insightful', then it is construed by Rob as useful and relevant neuroscience. Although this excerpt does not explicitly relate to Rob's discipline, further links are produced by the speaker in the following extract.

Excerpt 9

> ..I was thinking in relation to the dyslexic type issues again specific learning difficulties.. if somebody has got a specific problem in developing literacy, obviously the techniques that have been used show that people are taking much longer, there is more brain activity to process and memorise and de-code, that you know suggests evidence at a neurological level that combined with the ↑psychological data and this is where I think it can be helpful and also if there is going to be genetics work, if people are identifying different genes that are leading to differences in peoples sort of functioning and rates of learning. (Lines 155-163)

Rob also constructs neuroscience as bringing to bare the particular 'challenges' that people with certain learning difficulties face (Lines 101-102), particularly in that it 'provided some physiological evidence that went with evidence at a psychological level' (104-105)

Rob's broad construction of neuroscience therefore, seem to be located within the category or framework of a model (among other models) EPs [should] use as part of their practice. This particular contention is created by the formulation of certain constructs and positions. Rob creates a subject position where he made a choice about not following family trends and pursuing a different field, 'geography', psychology appearing to be the final but secondary choice. His reference to 'bog standard assessments' and the usual acceptance of EPs of taking up social constructionism, re-affirms this notion of *doing something different*. This creates the subject position of a free and autonomous EP, who is a free 'agent' or 'spirit' in their discipline. Neuroscience, to Rob, is perhaps then a possibility of exploration among other models and frameworks which inform his work as an EP. Furthermore, if neuroscientific evidence is accepted by courts of Law, and propagated in the media, Rob is then willing to give the same level of importance to neuroscience in his own discipline.

4.3.4. 'Neuroscience as Identification of Pathology Deficit'

Interview with 'Nora'

The following excerpts, give account of Nora's views about neuroscience, in which negotiation with the above construct of 'neuroscience as the identification of pathology or deficit' was particularly evident. In the following interview, Nora's constructions of neuroscience are about 'new technologies' (Line 76), 'brain imaging' and 'brain scans', which appear to characterise a particularly 'clinical' and/or 'technical' discourse about the brain. This link is also reinforced by other references. For example, neuroscience was 'supplementary' learning to Nora's educational psychology studies, and linked to courses such as clinical psychology and information from a 'man who worked at the hospital'. Her account of her earlier experiences of the subject area, leads to her suggestion

about why EPs may regard neuroscience as a 'deficit model'. However, she also negotiates with the possibility that other discourses (that of hope and opportunity), constitute part of the alternative sources of support for a person with a neurological condition. There is some indication in the interview that EPs must 'understand' this notion of neuroscience knowledge being a means to identify pathways forward for an individual, than the means simply for identifying difficulties or problems.

Nora's responses to the free-response task were firstly explored:

Excerpt 10

> *In the section about your particular views about neuroscience you mention that it may be [reading] "useful in providing specific information about brain injury and the consequences" can you expand on that a bit more?*
>
> I think that it was something that came up during the day with the clinical trainees (.) it was a man who worked at the hospital who dealt with children with acquired brain injury and thinking about that um, from an EP point of view, how being aware of how those injuries might affect their learning, processing and the implication and adaptations that might be <u>nec</u>essary following a trauma like that (Lines 98-103)

The brain in the above excerpt is centrally linked to the development of skills such as 'learning', 'processing' and 'adaptation', but in the excerpt below, is simultaneously the basis of trauma, injury, characterising the brain as something fragile and in some ways acting as a malevolent force against the body.

Excerpt 11

> *Did you get any ideas on how EPs were asked to apply that knowledge?*
>
> Before I started the training course I worked in a special school and (1.5) towards the end of my time there we had a young man who joined the school who had been, for want of a better word, TYPICALLY developing in a

> main stream school and he then had a <cycling accident and the difference and the impact it had on him> made me think back to that and thinking about accessing and the implications and things like that as well as the counselling type of thing (.) but from a more practical point of view I suppose and how then knowledge of that you could apply in the classroom using strengths and weaknesses to target different areas of learning (Lines 115-124)

To Nora, the brain is initially 'typically developing' and this is interestingly linked to mainstream schooling. Nora seemed to take note of a [marked] difference in the young person to whom the excerpt applies, with the implicit notion that the 'special school' has links with atypical as opposed to 'typical' (normalised) development. However, the assumption is made that the 'cycling accident' resulting in the brain injury necessitated certain provisions to be made and had implications for sources of support. The following excerpts are included here to trace the developments of Nora's construct of neuroscience as an identification of loss and deficit. Nora was asked firstly about her responses in the sentence completion activity.

Excerpt 12

> *Now moving on to what you felt other EP's views were you mentioned a couple of things that I wanted to draw out. EP views about neuroscience, you said for example [reading] "if it was presented in a medical context it may increase emphasis of a within child deficit model". Can I explore that a bit more? What are you suggesting from that in terms that EP's views, thinking of neuroscience in a medical context, can you expand on that?*
>
> Being in training and thinking about all the topics that are coming up at the moment for want of a better word, how we are <u>taught</u> to work and the psychology used and emphasised at the moment is more about consultation, making it systemic and organisation work as opposed to individual work and the word neuroscience for me anyway has the connotation is the opposite end of the spectrum.. neuroscience people might work in a more <u>med</u>ical setting and would be with<u>in</u> child and a more medical model as opposed to systemically (Lines 131-138)

You also mentioned deficit model, can you expand on that further?

Yes it is looking at what the child cannot do as opposed to looking at their skills and expanding on them (Lines 140-141)

You mentioned that [reading] "it doesn't always fit well within the current trends in EP practice and you mentioned a few of those trends being consultation, systemic work". You mention also that it might be linked to special educational needs. Can I ask a bit more about that?

…what I was thinking of at the time was the work around autism and different areas of brain function associated with that, about face perception and I guess that it might make people realise that it is not the child's fault that if they are processing things differently then we need to go about things differently rather than just saying that we can't do it (1.2) so I think that is what it made me think of in particular. When I was working at the special school we had a man come in to talk about the changes in Special Needs and different populations that are coming through and he touched on some neuroscience type topics and it made me of that as well as thinking to know the roots of any special educational needs if they can be pinpointed in that sort of area it might help understand the children's needs a bit more (Lines 142-157).

What is interesting is the subjectivity produced from these positions. Nora seems to be of the views that the presence of a deficit, does not limit the potential of an EP to help and support a young person. Nora adds that it will make people understand, perhaps in reference to EPs, that while an individual can experience the loss of skills such as learning and 'processing' ('deficit') there is, in Nora's experience, possibility and opportunity for individuals who have brain injury which can be realised in the work of an EP.

4.3.5. ‘Neuroscience for Responsibility and Duty’

Interview with ‘Martin’

The fourth speaker, Martin, appears to maintain a greater conviction with regard to his views about the value of neuroscience, particularly in relation to his role with looked after children, and the discourse of professional responsibility and duty linked with this. Martin draws on neuroscientifc ‘research’ early on in the interview to provide substance for his views. There is a reference to the standards and principles of science to determine the value of neuroscientific research and thereby provide accountability and credibility for neuroscientific claims. This seems to correspond in this discourse of an EP who, as becomes evident, has a position of responsibility over others.

Martin’s talk is composed of a variety of different discursive constructions. The brain firstly provides a ‘neurolopsychological basis’ for our understanding of others (Line 24); is linked to trauma and deprivation (Lines 59-60; 133); providing ‘clear’ and ‘arresting’ evidence. It is also ‘the organ of thinking and feeling’, and has a critical impact in early childhood (Line 70); showing obvious and physical effect’ (Lines 62-63); Neuroscience is also ‘a growing field’ (Line 53); something that is presenting ‘more and more claims’ (Line 50); The brain, to Martin, is also a ‘system’ that works together rather than separately; and goes through different levels of ‘sophistication’. Neuroscience also helps people ‘understand’ theoretical concepts easily. *Excerpt 13* seems to encapsulate these constructions.

Excerpt 13

> ↑I suppose on one hand I find some of the research quite compelling as I mean I said I have got a particular responsibility for looked after children and I think I have looked at some of the research about the effects of trauma and depravation including some of the research on the ↓effects on the development of the brain and in fact there is very clear evidence that severe trauma and severe depravation has an obvious and physical effect on the way the brain develops (.) so on the one hand I am sort of quite convinced by that sort of research. ↑On the other hand I read research around ADHD, dyslexia sometimes autism

> which seems to me to make rather exaggerated claims for what we know about the brain and how it underpins these sort of learning processes. So I think it's important as a professional that we get the balance right, you know we understand that the brain clearly is the °organ of thinking and feeling° and what happens to the brain and how it develops in early childhood is going to be huge hugely significant. On the other hand, its also important that we understand the research, we don't always take everything we read at face value so that we have got some way of weighing up the evidence and ↓actually making an informed professional judgement as to what is going to be useful in the work – and VALID (57-74)

It is notable that neuroscience is first construed by Martin in multiple ways. While neuroscience can offer 'very clear evidence' it can also contribute to 'exaggerated claims'. It is a way for an EP to apply a rationalised weighing up of the evidence, drawing on the metaphor of a mathematical 'scale'. However, neuroscience is, in Martin's view 'not anywhere near sophisticated' to answer complex questions. It can both be an organic object which is a basis of learning, however it is also given the analogy of machinery, like a 'system', again drawing on the discourse of order and/or mathematics. Martin refers to the quality of knowledge that can be derived from neuroscience. It can provide both 'Compelling' and 'arresting evidence', but you 'can get lost in it', 'blinded by it', and it is sometimes 'inaccessible'.

Excerpt 14

> I think some of the research is quite technical its very medical you need to get lost in it, you are literally blinded by science (.) so I think many EPs would find it (.) inaccessible and maybe feel rather intimidated by the almost the medical side of it (1.8) so I think that ↓would be the main obstacle (Lines 155-158).

It is interesting to think about what Martin's constructions are achieving for him. When asked to talk about his early training as an EP and areas of his interest, it is notable that Martin wished to speak about neuroscience as an area of interest straight away, although the option or decision to do this was largely left up to the speaker. Martin deploys the strategy of applying a scientific rationality to the discourse. This is echoed in Ghallagher's (2007) reference to educational

psychologists application of logic or 'technical rationality' by appealing, for example, to scientific methodology. This is both in the subject matter that Martin presents, as well as applying that same kind of logical flow to his own talk. He follows a process of presenting an argument, then a counterclaim, then an evaluation, perhaps reinforcing this kind of technical rationality that Gallagher describes. Martin equally comes across as cautionary and discerning in his views.

From the outset, Martin positions himself as an EP who is responsible in various aspects of his practice. He firstly 'manages' two EP teams, as well as (Lines 35-36) a multi-agency team. He describes his work as a Virtual Head of a school for looked after children (Line 40). Having come from such a background, the subsequent discourse seems to be constructed from within this position. For example, the EP is in a position of responsibility as a 'professional' to find the balance between the clear evidence against 'exaggerated claims'. In the following excerpt, a reference is also about what Martin regards as the 'key role' of the EP

Excerpt 15

> …I think as EPs we are trying to understand, it's almost our key role the logy bit of the psychology isn't it.. coming to a systematic and scientific understanding of ↓children's behaviour and learning what is all in the psyche bit of psychology and I think if brain research actually helps us to that understanding then ↑we are almost duty bound to you know take note of it. (Lines 77-82)

Martin's use of the term 'we' in an inclusive way for all EPs, is perhaps an extension of his membership to the professional body of EPs. Martin's declaration that 'as a professional we get the balance right' also suggests that he regards professionals to be responsible and ethical people' (by being balanced or fair), and his views about neuroscience can be seen to be constructed from this position. There is also the assumption that responsible people apply logical, balanced and scientific management to their thought, as he states, 'the 'logy' bit of psychology. Martin constructs the EP subject position as discerning and one that needs to come to 'balanced conclusions' about the

data that appears before them. He reinforces this view further in *Excerpt 16*, this time embedding his talk from within the position of science.

Excerpt 16

> *How important is scientific to EPs?*
>
> ..I think it should be important as I mentioned that's the 'logy' bit in psychology um (0.5) but I think (.) <psychology fundamentally should be a (.) science. We can prove everything we say but on the other hand we try to put together> a fairly (1.0) systematic shall we say and not always scientific in the sense it's always been based on experimental proof but at least a syst.. systematic and coherent understanding of why particular phenomenon whether it is a learning one or behaviour". (Lines 142-148)

Martin's views seem to be contributing to and reinforcing the overarching construct that it is necessary for EPs to be responsible and ethical professionals. This goes hand in hand with an equally systematic and discerning, logical, scientific approach to their work. 'Scientific' is not just defined as in the study of physical state or body, but more in the methodology that is applied. Drawing on the metaphor of the brain is a system, also seems to reinforce such a construct.

4.3.6. 'Neuroscience as a 'Correlate''

Interview with Lorna

In the following speaker's interview, the term correlate was invoked frequently in the process of giving views, and has been recognised as a discursive site. Lorna begins by highlighting that her definitions of the term, neuroscience, have been assembled from many sources. Lorna characterises neuroscience as a 'separate science' perhaps implying that, it is unlike psychology. However, her use of the term *correlate* in the context of her discussion seems to suggest that neuroscience can be used to understand psychological processes. For example, she later refers to the theory of attachment and behaviour. Neuroscience is also construed as a topic where the knowledge base is changing, and is under 'development'. These constructs are also part of the

subjectivity that is produced in the course of speaking. Lorna gradually reveals her reading of an influential book, which has shaped her views and has had an impact at an emotional level. The following excerpt explores the source of some of Lorna's views:

Excerpt 17

> *Just moving on to the focus of the interview, I was wondering if anything in your work as an EP at the moment influenced some of the views you gave about neuroscience in your sentence completion activity to begin with…*
>
> Yes I think what has been really fascinating in the last few years is the development (.) of ways of looking at children's brain development that actually provide an ↑evidence base for a lot of things that it was learning from different view point so having come from psycho-dynamic and attachment basis↑ if you like that actually now there are (.) neuroscientific correlates for what happens and I started to become aware of this some time ago but >I can remember one of my senior psychotherapists here< so it must have been over six years ago starting to talk about the children she was seeing as being *hard wired* for certain kinds of experience because having been traumatised their brains, the structuring functions of their brains, were actually effected and that this was an easy behavioural shift to make when actually some of the structure and the function of someone's brain has been so influenced by was going on (76-89).

Neuroscience is firstly constructed as 'freaky', 'about pathology', however later construed as something to simply understand current 'behaviour' and 'functioning'. There is the implication in the above excerpt that neuroscience can be consolidated with other frameworks of knowledge (in psychology), rather than be distinct from them. This particular view evolves in certain ways throughout the course of the talk. Lorna firstly states that she had come from separate fields of knowledge, such as 'psychodynamics' and 'attachment', but now is coming to form different points of view'. Lorna's constructions mark an interesting shift from earlier speakers' reference of neuroscience being antithetical to social models, for example, speakers Marion and Nora. Here Lorna argues that the brain is very much socially influenced, and also influences the social world of a person, such

that a person makes certain changes or shifts in their (outward) expression of behaviour

Excerpt 18

> *Just moving onto your viewpoints… you mention in your definition...I was just wondering if this definition is taken from a particular source or is that your working knowledge, for example, your reading…*
>
> Its a rag bag of bits really I have to say… there was very little about neuroscience really a bit in my first degree, very little in my EP training and I think it felt in many ways a separate SCIENCE and it dealt with the more extreme pathologies like the man who mistakes his wife for a hat that kind of thing [*laughs]* the freaky bits of neuroscience and I think what has happened as knowledge base is increasing there has been a convergence of what is known as behavioural relationship functioning level and what is known but this comes from sketchy bits of reading.- (Line 135-142).

Lorna suggests that views about neuroscience have historically shifted from a focus on older forms of neuroscientific understanding, being characterised as focussing on pathologies. However, neuroscience involves 'Different ways of looking', an 'evidence base', and constitutes different 'point of views'; furthermore, it provides corresponding information to psychodynamic views and attachment basis, all seeming to reinforce Lorna's idea of correlates.

Like an earlier the first Speaker Marion, Lorna's views are also influenced by other readings and by those who have written more knowledgably about the area. In the following excerpt, neuroscience leads to an increasing sense of relevance to all things EPs do. For example, it is linked to the 'quality of care', or implication for involvement of an EP at a practical level.

Excerpt 19

> *I was particularly interested in your views about evidence base and I was going to explore that a little bit more so in providing a background to what propelled you or influenced you in having the views that you have about neuroscience, is that what brought you to the interview?*

> I think that my relatively recent reading and re-reading of Sue Gherhert's[5] book I have certainly have that far more in my *mind now* that I would have done even a few years ago so yes I suppose I have an increasing sense of the relevance of neuroscience to all things that we do and I feel quite passionately about things, the ↓quality of care given to children in day care and what we see↓ increasingly in terms of children coming into nursery and reception classes with little capacity for self regulation for example, all stuff that we in a practical level are concerned about as EP's which is young children with >absolutely no capacity to manage their emotional states and their behaviour< actually having a fairly direct correlate with things like quality of day care before they start school and what we know about neuroscience. (113-129)

Lorna is therefore talking about being influenced by her readings, which also invokes a certain subjectivity. The book referred to seems to have had a transformational quality for Lorna in that she now has 'far more in my mind now', and leads to her 'feeling passionately about things'. Different categories of behaviour are also referred to. That is, the notion of 'self-regulation' and 'emotional states' which have implications for educational psychologists' level of involvement in these matters.

4.3.7. 'A Discourse of 'Forgiveness' and Removal of Responsibility'

Interview with 'Rene'

In the following speaker, Rene's views, references are made to neuroscience being 'something unusual for EPs' and needs to be consolidated with previously held knowledge to be 'hooked on to', with for example 'undergraduate studies'; Neuroscience is about the 'basis'; 'theory' and 'proof'. Something to see whether such difficulties as 'ADHD exists'; Furthermore, neuroscience is a component of the debate between nature and nurture; it simultaneously determines the course of development while also being able to contribute to change. However, to Rene, the brain is something different from explanation of

[5] Reference to author of the book, *Why Love Matters*, which refers to the quality of development of an infant's brain being influenced by the early care they receive.

the contextual factors around the child; It may help people understand about difficulties in others. In this speaker's view knowing about the brain means that children with various problems (associated with the brain) can be 'forgiven', leading to others removing responsibility from the child for the behaviour that they outwardly exhibit.

Excerpt 20

> I think it is really important, when you are training you are taught that there is this whole theme of linking theory to practise when you start (.) a lot of the (0.8) a lot of your practise isn't to do with theory and you are always encouraged to link it back to different theories but proof because I mentioned it in context of >whether certain exist like ADHD or the idea of executive function< and ↑for me it is really important. If it is a good theory and it makes sense and it helps people understand children if you talk about a lack of their executive function↑ then it helps the teachers understand and forgive the children more. It would be good if there was some proof or when you are doing some training on ADHD you could show them the picture of the brain and the bit that is different compared to normal children. (192-203)

In the following excerpt, the interesting notion is what has been silenced by Rene's reference to 'forgiveness'. Could it be the implicit notion that the child is otherwise to blame for their difficulties?

Excerpt 21

> Well that is a kind of question about nature or nurture(.) and I think although ↑not necessarily because when you are born with a certain type of brain, you have the nature side of things – the part you inherited what your genes say and then you have what happens to you when you grow up. Then your brain can change again because of that so I think that the brain is continually changing↑ so when EP mentions about children who have gone into care or have experienced trauma or abandonment or attachment theory, or people with attachment disorders you can see it in their BRAINS though I don't know how I assume by scans. What was the original question you asked?"

> *I think it was do you think that other EPs think share your views that the brain can tell us something about problems in children*
>
> Yeas I think they would and that is part of it, like I said earlier about children being part of the system they wouldn't be so naive to think that it is only the brain that is having an effect on everything else that obviously the experiences that you go through and the system you are in be that your family, school is (.) going to be part of what children are like and it's not just the brain it is what surrounds the child as well (213-231)

Rene first distinguishes between the nature and nurture, a particular discourse in psychology and other scientific fields about childrens' development being the outcome of either their biologically inherited characteristics or their experiences. To Rene, the brain is something that inherits through changes and leads to change. But Rene also counterbalances her views. For example, Rene equally states that it would be too simplistic to assume that the brain is exclusively responsible for difficulties. It is also about 'systems', 'experiences' and the 'family'. In deconstructing the brain in this way, Rene characterises the brain as an object that absolves the child of responsibility or blame.

4.3.8. 'Deconstructing the EP role'

Interview with 'Paula'

In the following excerpts, the speaker, Paula appears to negotiate with the EP role when giving her views, leading to the choice of the above discursive site. Paula seems to apply the process of checking, justifying and reasoning with her views. It is interesting and notable, when applying the 'micro level of analysis' that Paula's talk is marked by following a sequence of deductive statements (for example if-therefore clauses), in order to come to a discursive understanding of what neuroscience is or *means* for the EP. Neuroscience was therefore being used to deconstruct the EP role. Paula states for example,

Excerpt 22

> I think the more information and knowledge we have about the basis of human behaviour then the more aah (0.8) we can assist or understand therefore help other people understand so it is something that >would be useful as I understand science is developing and the more developed it becomes< the more tools we have to do our work (102-106).
>
> If I am understanding what neuroscience is (.) correctly then it seems to be quite difficult because in a sense we are dealing with the END result of when things go wrong neurologically but I presume that we could supply evidence of behaviour and types of behaviour and certainly we would use some understanding of it try and understand children's behaviour attachments and emotions and so on but it terms of developing the actual °science it is very hard to see that° (108-114).
>
> ..but otherwise to be doing it as a lone EP I think would be next to impossible or I don't know if you or I could, >maybe someone else could< (149-151)

To speaker Paula, neuroscience is at first 'medical', but there is an uncertainty about how the area pertains to psychologists as well. It is also a basis to human behaviour. It is 'useful' because the more information and knowledge is available, the more the EP can help or assist others. Science, and therefore neuroscience, in Paula's view, is something that develops and 'is developing', and as a *consequence*, more tools are available. In this reference, Paula refers to the tool metaphor, as an explanatory construct of the brain as an instrument. Neuroscience is also the 'end result of when things go wrong', drawing again on the construct of loss or deficit. However, this time, the choice of 'end result' suggests that problems encountered by the brain (for example, loss or deficit), are irreversible.

In reference to the discursive object, Paula refers to it both as 'medical' and 'psychological'. It is notable that when she refers to neuroscience [it], as the basis to human behaviour, she seems to imply that there are two components to looking at behaviour. Behaviour is for example, action. It is something which has a 'basis', in physiology. On the one hand however, neuroscience is a tool to

use and aid in understanding, while it is 'developing' as in the case of research, it is also seen to be a static object, which is the 'end result' of something. So while being the end point, it is also developing as a discipline, as a science. So in this speaker's view, while EPs cannot contribute to developing the whole science, they can use it as a tool for understanding behaviour.

In the following excerpt, Paula is further deconstructing the role of an EP by making reference to the Local Authority, and how the Local Authority seems to influence educational psychologists' work.

Excerpt 23

> *Can you think of any issues related to EPs engaging in this area?*
>
> Well to be boring um (1.5) there is [*laughs*] a tremendous pressure on ↑TIME, we are working for local authorities and local authorities are not interested in developing our understanding of neuroscience, they are interested in us >seeing children, assessing them and working out what support they need< so thats a major major obstacle and we are all running to keep up in terms of providing schools and local authorities with what they (.) want at the moment. There is some scope for developing your own areas of interest and (its being reduced)° the opportunities to develop your own particular specialities and that sort of thing.
>
> *I see….*
>
> Well, the local authority and our work, THEY are the people who actually pay the salaries and provide the money [*laughs*], at least at the present time (1.5) so I think that their views have got to be significant, that differs from authority to authority. Some services people have got much more autonomy to undertake the role in the way they see fit and others are much more directed and more controlled so I think the local authority is significant and one thing we should do is to try to do more research because EP's are people who have got a lot of research experience we know how to undertake studies and report on them in a professional manner which not many people in the local authority do particularly if peoples are doing three year doctoral training, your undertaking research and study at a doctoral level, that is an advanced level of study and I think that the local authority isn't aware of the value and the

> contributions that these people could make in their service, into the analysis on who the authority could be more efficient and effective in its delivery of service. (203-216)

In this final excerpts, the reference to the Local Authority suggest that views about neuroscience and its application to Paula's work, are not entirely self-generated but by others; they are also bound up with tensions around job-security and the thoughts about the future of the profession. Paula seems to suggest that EPs views must be influenced by views about the local authority. The dichotomy of 'autonomy' versus 'directed' and 'controlled' seems quite significant, and seems to characterise some of the boundaries of work. Paula seems to be deconstructing the EP role by making reference to the particular 'rift' in perceptions between the Local Authority and educational psychologists. As such greater awareness needs to be made about the potential 'value' of other forms of work, such as 'research', which the educational psychologist can carry out.

4.3.9. 'Historically Situated Knowledge'

Interview with 'Elsa'

In the following interview, Speaker, Elsa offers various constructions of neuroscience, finally settling at the discourse of neuroscience being a kind of fluid knowledge that changes over time.

In Elsa's first constructions, neuroscience can 'inform' and 'underpin' the 'practical' work an EP can do. However, this initial view is contrasted in other references, revealing the variability of discourses possible. Neuroscience is associated with the possibility shut off routes and stifle 'expectations' (of a child or young person). Neuroscience is also part of pieces of information contributing to a whole picture; is contingent on how people see the world; or different way of answering questions about the world; it is located in history about how knowledge develops; is particular limited in the information it can provide, while also offering 'power' and 'force' to a recommendation.

The Speaker's first reference to neuroscience is one of curiosity as well as uncertainty:

Excerpt 24

> I am curious about it. Like everybody, I am not really sure how it works..
>
> *Can I explore that a bit more, you feel that people or EP's should think about it?*
>
> I think people should at least know about it and KNOW about some of the issues. I suppose its (1.2) my impression it is one of these things that one shouldn't go down the (.) full route and say that is what we DO (1.2) hopefully it will inform SOME of the things we do and underpin things. For example if you make a recommendation you should TRY to do something with a child in school, you should accept that there would be some neuro-psychological effect on that >you don't know what it is because you have no way of checking it would work< on the behaviour but knowing you have got a little bit of power and more force to your recommendation to what you are doing.. (Lines 54-74).

Elsa maintains in this excerpt that neuroscience is not a piece of knowledge to which 'people' should fully commit. Whether her reference to 'full route' is in reference to studying, practicing or working, it is unclear. However the phrase, 'that is what we do' may be in reference to 'action that is taken' so may have been used by Elsa to refer to something linked to work and practice. However, Elsa, like an earlier speaker (for example, Marion) also shows a kind of passive acceptance of knowledge. She states that when making a 'recommendation' and trying to do something with a child in school, 'you should accept that there would be some neuropsychological effect on that ..' However, 'you don't know what it is, and have no way of checking it'. It is notable in this last reference, neuroscience is constructed as so powerful an influence, that actions such as 'checking' are not entirely necessary. The point that neuroscience can offer 'power and force to a recommendation', according to Elsa, seems to validate its use.

This particular construct was explored further.

Excerpt 25

> *You are mentioning power, force and knowing. Is knowing something that you feel is quite important to EP's (1.2) knowing the base of the things as you were saying?. How far do you think this is important for an EP?*
>
> ↑I think it probably is important for any professional that what they DO has some basis (1.8) and as much FACT as you can discover about it (0.8) you should look at the history of how knowledge develops It is a lot about beliefs, we believe certain things about (1.8) I was watching a programme about humors[6] and that medicine was about humors, >but we know that it doesn't exist anymore and has been replaced with something else< but we got a bit more information about it because people have been able to cut up bodies and done things with bodies to discover thing but we know that in another fifty years there might well be another (1.5) revolution in looking at (1.2) the medicine or psychology…(Lines 78-87).

In the above excerpt, Elsa refers to neuroscience as a 'belief' which is 'discovered' (rather than accepted). Elsa states for example, that 'we believe certain things'. Neuroscience is also the product of a revolution in knowledge about things. Nora draws on the idea, that if people believe it, and it is a widely accepted belief at of a particular time in history, then it is likely to give power and force to recommendations. Knowledge is about information and discovery, but is also 'situated' and can change.

It is also notable that Elsa locates neuroscience within history and makes reference to the way knowledge develops. Having stated this, it is only part of a broader picture. This perhaps goes a little further than the other interviewees' constructions about neuroscience simply being another aspect of knowledge EPs can draw on, such as one of many frameworks and models.

[6] Elsa seems to refer to the ancient but now discredited theory of humors being used to explain the working of the human body (Sudhoff, 1926; Kagan, 1998).

In these final excerpts, the researcher felt that critical and broader discourses were being drawn by the Elsa. Elsa begins by stating that neuroscience brings in power and force to a recommendation. There is the implicit assumption here that neuroscience is knowledge of power, and therefore can give more of an impetus to an educational psychologists' work.

The first question to Elsa involved describing her first thoughts about neuroscience being investigated by an EP in training. This seemed to lead to some spontaneous, but uncertain views. When asked about the importance of knowing, Elsa seemed to re-assert her cautious position by stating that knowledge is uncertain anyway. It is about 'belief' and 'discovery' rather than something to hold fast to. This discourse was perhaps expanded on in the next stage of the interview. For example, the EPs role is about expanding expectations, the interpretive repertoire of 'shutting off routes' was deployed in order to construct neuroscience as something limiting.

4.3.10. 'The Discourse of Building Bridges and Cross Disciplinary Dialogue

Interview with Bill

The following speaker, Bill makes many different references to neuroscience in this interview. It is in part embedded in the context of his experience with others, and also components of the studies he had done in his younger years. Much of his talk is a narrative account of such experiences. Bill's subtext could be seen to be that EPs are never involved in neuroscience during their career experience, and he is equally unsure about why this may be the case. He makes a lot of reference to research, books, data, perhaps owing to a greater length of time and investment as a semi-retired EP. From the outset, neuroscience is 'physiology' and medical, and several references are given to medical condition, 'hydro-cephalic'; 'spina-bifida', areas in Bill's views related to neuro-psychologists and geneticists. Neuroscience is also referred to as 'untapped potential'. However, the dominant theme that emerges involves the lack of communication between professionals about the area of neuroscience.

The subject position simultaneously brought into being is an independent and fairly solitary educational psychologist who could both benefit from other peoples' knowledge as well as share their own for the benefit of others. He firstly declares that there has been a lack of interest among EPs of this area of knowledge.

Excerpt 26

> …not many EPs are interested in this field as far as I can remember, as long as I have been in the field which is thirty years so - not many! (Lines 9-11)
>
> *Do you think there is a need for EPs to be engaged?*
>
> ..I think there is a need to because <from my readings in the late sixties and early seventies we are forty years on in research and forty years on in technology and forty years on in developing the MRI scan> (multiple images) and looking at deep areas of the brain and other parts of the nervous system and how the nervous system works and >>I don't know if that has come into educational psychology<<. You hear of things like brain gym and things like that, whether they are valid and whether they have been born out of reality and if they have been tested enough under controlled conditions we have children who get other brain stimulation which is not (danger proven) and measuring the outcomes I haven't read that it has been ↓done to any great effect and yet it has been pushed in schools °and a range of trusts across Western Europe° (Lines 53-64)

In the second extract, there is a tone of uncertainty about the progress of neuroscience, and further uncertainty about why there is a lack of involvement by educational psychologists. This is particularly emphatic in Bill's repeated use of the numbers of years to define his time as an EP. Neuroscience is simultaneously viewed against the use of 'brain scans', next to terms such as 'valid', 'reality', 'controlled conditions' all drawing on the discourse of scientific enquiry. The value of certain types of programmes must then be tested against these controlled conditions to have a status of validity. In stating these points, while Bill seems to be questioning and even evaluating the role of neuroscience, within the following excerpt, Bill also states that it is not an 'EPs function' to be involved in neuroscience but a component of professionals

working together. The concept of 'multi-disciplinary' engagement, or working in teams with other professionals, is highlighted and explained:

Excerpt 27

> ….I don't think it is the EP's functions and that brings the whole thing to a multi-disciplinary context (1.2) and closer liaison between disciplines which there doesn't seem much time for these days regrettably (1.5) not enough time. There should be more multi-disciplinary training in certain areas and there IS with social services with child abuse and child neglect (.) and child protection. With child protections there is multi-disciplineary training and I (.) don't (.) see (.) such multi-disciplinary training because it is not driven by some kind of law (1.8) for severest children which means professional people working have to have a common code of what to do and what to look for and what to do (Lines 162-171).

There is perhaps an element of the speaker's subjectivity in the above excerpt. His use of the term 'regrettably' may suggest that multidisciplinary working is a preference of work that for this speaker was not fulfilled in his career. It is notable and interesting that Bill does not see neuroscience necessarily as the EP's role. However, in the next few excerpts, Bill makes reference to a case in which a neuropsychologist was viewed by Bill as making a 'misguided' assessment. The excerpts seem to read together like an evaluation of the particular neuropsychologist's involvement with the case referred to.

Excerpt 28

> *Should EP's TAKE from other disciplines and knowledge of this so they can apply it?*
>
> Yes and also give… and give >>to the other disciplines<< (.) I'm just think(ing) a neuropsychologist who assessed a child VERY recently for our department (1.8) not locally but the child was sent by a medic following a neurological assessment that came back with an assessment that °was totally misguided. The neuropsychologist was looking for a certain thing, in other words could the child talk?... Didn't look at language and severe epilepsy (bangs his head and falls falls forward at any time) and neuropsychologist didn't

> help at ALL towards that and that was because a lack of awareness in the neuropsychologist's training and background (*laughs)* and brief that restricted him or her in the assessment that was done - (Lines 174-179)

Bill seems to be highlighting the particular need for EPs to collaborate with others, putting forward the strengths of their own role. It also constructs the neuropsychologist as only looking for a 'certain thing', relying only for limited information. On two occasions, for example, Bill highlights the neuropsychologist's interest in whether the child can 'talk' while in contrast, the EP seems to search for various other levels of explanation for the child's difficulties:

Excerpt 29

> … It was the same child as WE see and WE know there are HUGE language difficulties there and we think that its possibly (.) probably correlated is maybe not (causal) .with the ↑epilepsy and the severity and frequency of the (episodes and) fits that take place on a daily basis for this (1.5) child but the neuropsychologist didn't look at this at all. The neuropsych said can he talk? Yes he can talk, >>just looked at the motor function of speech (…) didn't look at language as such<< and I think we need to educate OTHER professions that is why I say that >>there needs to be multi-disciplinary training needs to be there<< and liaison because I don't think that psychologist in a health setting elsewhere liaised (.) with (.) our service (.) who °oversees the child at school° and if we put the TWO views together that child would have benefitted. And that child is STILL there and people are working separately around him different (orbits around) the child so we are LOSING information I think… (Lines 188-200)

Bill highlights firstly that it is 'the same child' to perhaps stress that it will be the same case that will be given two different evaluations. The implications are that one would be more thorough, as in the case of the EP, while the other, more limited, as in the case of the neuropsychologist. It is perhaps notable how neuroscience itself is constructed here. It is implicitly linked to the work of the neuropsychologist, who is in turn positioned as someone offering limited information. However, the EP is implicated as a professional who can add

greater levels of understanding. This seems to reinforce and support Bill's broad discursive construction, and offer a case as to why EPs and professionals would benefit from cross-disciplinary collaboration. It is notable that Bill's subject position of the EP is contrasted with that of earlier participants. While Marion for example, spoke of gaining knowledge from other sources who were knowledgably more superior about neuroscience, Bill's constructions demonstrate that EPs seem to be in a position to offer more broad and alternative explanations to neuroscientific ones. This then characterises the EP as more informed, discerning and knowledgable. The possibilities mapped out by these constructions are then about engaging with, rather than alienating from other professionals.

4.3.11. 'Promoting a Political Agenda through Neuroscience'

Interview with 'Phil'

In analysis of the final speaker, Phil's interview, Phil places his views about neuroscience within the broader discourse of social justice. Neuroscience can equip EPs with knowledge of influence and power, which can in turn lead to a 'distinctive contribution' in their profession.

Phil's initial constructs of neuroscience highlight an 'additional perspective' (Line 22) drawing on the construct of knowledge being composed of many perspectives. It is also connected to cognitive theories, such as theory of mind (Line 26); something that can be 'stimulated' (Line 28). Interestingly, the brain is also located in history (44-48) through investigations into brain injury, neuro-psychology and studies such as that of Phineas Gage[7] (Lines 44-58). Neuroscience also provides 'a real potential for good understanding', about very difficult needs, or those that are 'complex'; 'severe' and 'multiple' (Lines 88-89). It also provides opportunities for others to help individuals to 'regain skills or minimise loss of skills' (Line 101); It is deployed in the context of offering a 'distinctive contribution' (which seems linked to a political discourse of the EP profession, for example Boyle, Mackay, Lauchlan, 2008, p. 34). Finally,

[7] An American railroad foreman who, in 1848, survived an accident in which a large iron rod pierced through his brain, damaging the frontal lobe. The event influenced theories of localisation of brain function.

while neuroscience is also a way of giving hope to others about the support that can be provided for children's needs, it is simultaneously constructed as something potentially 'dangerous'.

Phil starts by painting a picture of neuroscience offering the scientific 'bases' for different needs. It is associated with a whole plethora of different syndromes and difficulties ranging from dyslexia, to stroke attacks. However, these constructions seem to be deployed to lead to an eventual commentary on how neuroscience can contribute distinctively to the profession.

Excerpt 30

> *Ok…, moving onto the next question, how far do you think EPs then are able to talk about neuroscience, say…, to other professionals.., people*
>
> I think it is essential that we do because we have to be (.) stating (.) and making CLEAR what our distinctive contribution is and I think that we HAVE the skills and knowledge and we should be able to clearly state that this area of the brain is concerned with xyz um and this young person may have experienced whatever (.) and as a result this may impact on his or her functioning in this way or THAT way so what WE need to be doing is supporting this young person in whatever way is you know (0.8) most effective and alleviate those concerns ↑so I really think we do need to be standing out and making clear what we can offer and we can offer, we ↑can - (Lines 104-114).

These conditions and problems are juxtaposed next to their evidence base to offer greater credibility for the speaker's position. The political discourse of a distinctive contribution is used in the context of EP professionals being independent and assertive. For example, this is evident in the remark, 'being clear and pushing forward an agenda'.

On the other hand however, there is a tone of reservation in Phil's talk in that neuroscience, although knowledge of influence and value, should not be used as tool for merely 'labelling' a young person. In the next excerpt, Phil begins to qualify what he has meant by valuable neuroscientific knowledge:

Excerpt 31

> The KEY thing is um (.) laying out how it is relevant TO them and how it is applicable (0.5) to their particular young person in their environment and that is what makes it meaningful and that is what makes (0.5) our intervention, our input (0.5) effective.
>
> *You mentioned the term 'plasticity' in your sentence completion… I was wondering why you used this term..*
>
> Well I think that it is very important because in terms of (1.2), you DO have to be very careful with (.) how you express (1.2)needs to particularly staff in schools and parents as well and you have to be very clear that (1.8) there is hope and you have to put a positive spin on it because you don't want people to feel that there is yeah - not hope limited by labels that is why the understanding of plasticity is so important, that the brain can respond, can change um you know in response to its environment and >>experiences<< so that is why as a way to avoid <<limiting, negative discourses>>, this person has this problem we there is nothing we can do about it. Oh dear! we don't want that, we want - this person has this issues and we are doing to do this, this and that will help them to perform better. (Lines 226-242)

It is interesting that Phil's constructs of plasticity (the ability of the brain to adapt and change) is linked with terms such as hope and a means to put a 'positive spin' on discussions about the brain. Phil's references also construct neuroscience as something seen as 'limiting' by others, for example, parents and teachers. In a sense, Phil seems to suggest that such individuals as parents and teachers need to be 'encouraged' to be helped by the EP to think more optimistically.

The subject positions that are made available by these constructions paint a picture of the EP who is confronted by a large number of complex situations; someone who justifies their choices as professional, while also actively seeking out an application of knowledge that is relevant. There is the sense that in view of neuroscience being a controversial topic, the EP must seek out 'key issues'; The EP is also described as an 'applied psychologist' who is creative and speaks out about things as a matter of social rights and social justice. Contrary

to this, however, there is the issue of labelling and marginalising others by applying neuroscience to various issues.

In terms of subjectivities, Phil's constructions also suggest that the EP has the particular ability to make a difference, face challenges and be independently creative.. However, there is also a caution which is brought about by Phil's perceptions (and perhaps also experiences), with regard to speaking up about what you believe despite other EPs' reticence about doing different things. From the discourse of social justice, for example, Phil is also cautious about being too abrupt due to the particularly strong belief that people should not be 'labelled'.

4.4. Summary of Findings

This ends the analysis of data taken from interviews of ten educational psychologists. The analysis has broadly followed the six Foucauldian steps of analysis as outlined in Willig (2008), while also including commentaries on the technical features of the talk as in the Discursive Psychological (DP) approach. Additionally, there was reference made to the discursive resources EPs draw on which have implications for educational psychologists' institutional or social actions (FDA), thus carrying out analysis with a combined focus on discursive practices as well as discursive resources. The next chapter will offer a discussion of the main findings and their implications specifically linked to the research questions.

5. Chapter Five: Discussion

The current research investigated the views of a group of educational psychologists about neuroscience. The aim of the research was to explore how the educational psychologists talked about neuroscience, in order to understand how they were constructing it, what implications these constructions might have for their roles and the impact of these on their practices as educational psychologists. It was hoped that the educational psychologists' discursive practices would then help the researcher to understand what factors may

enable or limit educational psychologists' engagement with the area of neuroscience. This research has hoped to shed light on the contradictions and tensions that appear to be influencing EPs views about neuroscience.

This chapter will aim to critically discuss the research findings. The researcher will review the principal outcomes of the study and will discuss the impact of having a combined analysis of data using both Discursive Psychology (DP) and Foucauldian Discourse Analysis (FDA). The researcher will then consider the implications of the research for educational psychology theory and practice and identify the key recommendations for future research. The research outcomes will be related to the broader educational psychology literature and the quality of the research. The researcher's reflexive position within it will be considered here.

5.1. Revisiting Aims

The primary aim of the research was to find out how the topic of neuroscience was constructed by a group of educational psychologists. The researcher's second aim was to identify the subject positions that were enabled by these constructions. Finally, the researcher was interested in how educational psychologists' talk, opened up or close down opportunities for action. These aims were directly associated with the research questions, and will be explored in the next sections.

5.2. Outcomes of Analysis

Research Question 1: How do educational psychologists discursively construct the role of neuroscience in their discipline?

The researcher's aim has been to invite a group of educational psychologists to speak about neuroscience, from the particular position that neuroscience is already a contentious and controversial topic (Geake and Cooper, 2003). The researcher was particularly drawn to the variation of views presented in literature, suggesting that there would likewise be a set of varied constructions about neuroscience (Parker, 1995). By asking EPs to talk about the area of

neuroscience, it was hoped that some of these variations would become evident.

Broadly speaking, the analysis showed that EPs constructions about neuroscience did not deviate from the broad acceptance of neuroscience as the study of physical phenomena as associated with the activity of the brain and nervous system. From this point of view, various processes related to the brain, its structures, and methods used to investigate it were discussed and were seen as points of reference. The constructions therefore, exposed a certain *shared belief* about neuroscience as investigating the brain as having a physical (perhaps verifiable) existence. However, in line with Foucault (1972), the researcher was not 'disputing' the validity of neuroscience or 'seeking to diminish its scientific nature' (Foucault, 1972, p. xii), but rather interested in how neuroscience was constituted in EP discourse and what the constructions aimed to achieve. In relation to the EPs interviewed for this research, neuroscience seems to occupy the position of a legitimate (scientific) field of enquiry (Potter & Wetherell, 1987). EPs made reference to the 'established rules' which characterised scientific knowledge. For example, reference to use of 'experiments', and coming to a 'systematic' and 'evidence-based' understanding formed part of this construct (Gilbert & Mulkay, 1984). In addition, research evidence was also made reference to on occasions by EPs, which was used to highlight the sometimes seemingly influential nature of neuroscience knowledge. For example, [Rob] referred to the media's portrayal of a perpetrator of a crime being absolved because of neuroscience 'evidence' being brought forward. [Martin's] formulation of arguments also seemed to present neuroscience as evidence that is potentially compelling, and should have a 'common sense' connection with different areas of complexity faced by EPs.

However, the method of discourse analysis used seeks out variation. The central claim of discourse analysts has been that talk and texts must necessarily show variability, drawing on the many available resources in society which contribute to the formation of constructs about a topic (Coyle, 2006). In the Foucauldian sense, Gallagher (2007), refers to this as 'sites of struggle' (p.66), while Hollway makes reference to *ideological dilemmas* (2007). For

example, the EPs' constructs of neuroscience bring up the possibility that there are other alternative constructs at work, sometimes, conflicting and coming into direct tension with constructs of neuroscience. [Nora's] reference to neuroscience, as a tool to investigate pathology, for example, brought into being the notion that EPs may see their work as one which identified problems and limitations in a person. This is echoed in Kelly at als' (2008) reference of medical models which have historically been seen to limit the conceptual frameworks used by EPs. On the other hand, social constructionism is drawn upon, for example in the case of [Marion], as a position that allows EPs various possibilities and explanations in their work.

In a sense these constructs respond to the notion of *reductionism* that neuroscience can be potentially linked to (Byrnes and Fox, 1998; Kelly, 2008). Rather than simply accepting the construct of 'reductionism', the EP was seen to negotiate with this construct. [Nora] stated for example that while a person can be identified with a neurological condition, the presence of such a problem does not limit the potential of an EP to help the young person. [Nora] seems to suggest that knowledge about neuroscience can be linked to such things as 'learning', 'adaptation', and 'expanding' on skills, rather than be linked to problems, deficits and loss of skills. Such alternative way of viewing neuroscience seems to reinforce Edwards and Stokoes' (2004) notion of 'respecification' in discourse. In other words, reference to neuroscience was not unitary (as for example, linked to a pathological or deficit model), but present possibilities for alternative constructions to be applied.

The researcher selected and drew on a range of constructions to establish an overarching 'discursive site'. This was done in order to establish a certain 'coherence' in the data analysed. The ten different discursive sites, it can be argued occupy the *conditions of possibility* (Gallagher, 2007), through which neuroscience can be understood. Neuroscience is at once, for example, knowledge of Responsibility and Duty [Martin], or a Correlate [Lorna] while also being another 'Explanatory Model' [Rob]. It is interesting that while one of some lenses present neuroscience as static and deterministic, others present neuroscience as historically *situated* knowledge, and changing (for example, Elsa refers to neuroscience as part of the development of knowledge). These

interestingly illustrate dichotomous constructions of neuroscience, which then become 'available' to an EP to negotiate their identities, and influence their actions and choices.

Research Question 2: What subject positions are warranted by these constructions?

The ways EPs constructed neuroscience is inextricably linked, in the discourse analytic view, to the development of a particular subject position. Subject positions offer 'discursive locations from which to speak and act' (Willig, 2008, p. 116). In Edley's (2001) view people speak from within an ideology and that ideology 'creates or constructs subjects' by drawing people into particular positions and identities' (p. 209). Just as in the seeking of constructions, the researcher also looked out for the plurality of subject positions. Foucault's notion of *technologies of the self* (Arribas-Ayllon and Walkerdine, 2008) has been particularly relevant to this question. Revisiting this, Arribas-Ayllon and Walkerdine refer to how these technologies 'make sense of local interaction between people and draw attention to the ways in which people exercise power over themselves and engage in processes of self-regulation' (2008, p. 101-102). Not all EPs would position themselves in a unified way with one another in their constructions, and subject positions will be mobilised through different views as well as the regulatory practices (such as, for example, the frameworks and models that the EPs may apply in their work). Therefore, notable and oppositional subject positions became apparent. As Edley (2001) states, ''The subject is produced outside of herself in discourse, and because we are part of many discourses, the self is multiply produced, dispersed across a number of discourses' (p. 91).

Analysis of data helped to show that the educational psychologists were positioned by family, their experiences, interests and their roles in educational psychology. For example, being in the position of a Trainee or maingrade educational psychologist, meant that 'that's how we were trained to think'. This perhaps suggests that the subject position is one of a subsidiary role of student and learner, taking on knowledge from a more superior source. It may also be argued, that a senior position of more responsibility may produce a type of

authoritative subject position. An EP in this position may align themselves with approaches and knowledge (like science) which have a greater power to influence thought and change (for example, in the case of Martin). On the other hand, to the speaker [Rob], EPs are characterised as *free spirits* and *eclectic* in their views. They are not confined by certain 'models' of working but can select from among other models. Subject positions then are as plural as the constructions from which they arise (Jager and Maier, 2009), and discourse analysis has shown that a rich picture can be obtained about how various views are formed from within these positions.

Research Question 3: What implications do these constructions have on educational psychologists' practice?

In this research, constructing views about neuroscience became a vehicle through which educational psychologists could talk about their practices as educational psychologists. It has been highlighted in the literature review that educational psychologists form a particular institution or discipline (Gallagher, 2007). Foucault (1982), for example, talked about how a discipline's discourses are necessarily bound up with social actions. So, in terms of the present research, what have educational psychologists' constructions of neuroscience said about their subject positions or identities? In turn, how do these constructions and identities influence educational psychologists' actions and social practices? This is perhaps the question that looks quite critically at the roles, duties and professional practice of educational psychology.

In the review of literature, the researcher highlighted that educational psychologists were being called upon to participate in dialogues about neuroscience. A range of actions were proposed in which educational psychologists were invited to partake. These ranged from Goswami's (2004) proposal that educational psychologists' could assist in areas such as identification of children with learning needs. Benton (2010), for example, stated that EPs should become more 'knowledgable' about the brain to identify research questions or transfer knowledge to, for example, teachers. Howard-Jones (2008) has also proposed that EPs should contribute at the level of psychology, to bridge the gap between neuroscience and the classroom.

However, the question was posed as to how EPs themselves construct their roles?

Wolfendale (1992) states that EPs roles can be defined by what EPs do. The emphasis in literature seemed to be in the social activities of being an EP. This was reflected in the speakers' references to such aspects as 'social processes' being prominent in EPs' constructions of their roles. [Rob] shared his interest and appeal, for example, in doing group work at a systemic level. [Marion] also referred to social constructionism and social justice as the focus in educational psychology work.

It was highlighted, in the literature reviewed, that the discourse of neuroscience, may be incompatible with the theoretical and conceptual frameworks drawn on by educational psychologists. Kelly (2008), for example, refers to how Constructionist Theory currently seems to dominate the work of EPs. It might be recalled that Fox (2011) also refers to the practitioner-research model, where the proposal is made for EPs to base evidence on their practice, rather than restrict their practice by exclusively basing it on theoretical evidence. Clearly this highlighted a rift between the call for EPs' involvement in neuroscience, and the perceptions of educational psychologists about their roles. While EPs are being asked to consider neuroscience as a possible theoretical model, analysis of discourse suggests that this may conflict with the social practices that have become evident in EPs' language or discourse. As such, language can be seen as a medium through which people speak about and therefore, make sense of their social practices. For example social models are seen as the antithesis of medical or biological models, and these can be seen to limit educational psychologists' engagement with such knowledge as neuroscience.

Almost all EPs made reference to broader beliefs and practices influencing the choices they make as professionals. In Foucault's view, these beliefs are a part of the 'extra-discursive' elements of discourse. Dreyfus and Rainbow (1982) describe extra-discursive aspects as 'background practices', the processes and human activity within an institution (Foucault, 1972). Foucault made reference to certain power imbalances between people, and within communities and societies, which then have implications for the borders and limits of peoples'

social actions. For example, the influence of the Local Authority was particularly notable in [Paula's] references. [Paula] seemed to construct the Local Authority as influencing EPs' roles and responsibilities. This type of reading has been necessary because it describes how certain discourses can limit and enable social action. In other words, it can be said that educational psychologists make reference to the patterns of work that are more accepted within the discipline of educational psychology, which in turn leads to a regulatory control of them as individuals. Mackay (2002) makes an interesting assertion in a recent publication entitled *The Future of Educational Psychology,* the author interestingly notes:

> *There are respects in which the profession is a rather odd one. Its position renders it ambiguous and vulnerable, and very subject to role conflict. Perhaps it can best be summarised as follows. Educational psychology is a service that one party (children, parents) receive (often whether they want it or not), usually requested for them by a second party (teachers or head teachers), but funded by a third party (education authorities) using funds that are not their own, but are provided by a fourth party (the taxpayer), to meet the statutory requirements imposed by a fifth party (the Department for Education and Employment), at the hand of a sixth party (educational psychologists), the availability of whom is largely dependent on the organisation, interests and economics of a seventh party (the universities). Is it any wonder that the profession is marked by role conflict?* (p. 246)

This quote by Mackay (2012) is illustrative of the multiple influences governing professional work. It is interesting as a piece of discursive text in itself. It suggests that educational psychologists are positioned in certain ways, by certain structures, which in turn influence their subjectivities, actions and choices. The discipline, in Foucault's (1972) view, is embedded in power relationship and it is from this position which the discipline makes meaning.

> As Gallagher (2007) states,
>
> 'All the things that are the discipline's dominant discourse, what metaphors and values are endorsed, what remains unsaid, and what knowledge is marginalised are actually the result of social negotiations and power relationships…' (p. 64)

Reading the data from the point of view of Foucault, for example, enabled some these influences over educational psychologists' professional work to become apparent.

Summary of Research Questions:

The sections related to Research Questions have highlighted that neuroscience has been constructed in various different ways by educational psychologists. Neuroscience was, for example seen as another explanatory framework for EPs, something that challenged social constructionist ideas, knowledge that is developing and changing, and also linked to the discourse of building bridges. Certain subject positions were also taken up by the educational psychologists interviewed that were linked to these constructions, such as EPs being free and autonomous, distinctive in their roles, or adopting stances such as social constructionism. In addition, educational psychologists' constructions and subject positions were also linked to their practice as educational psychologists. Responding to neuroscience, for example, enabled speakers to interrogate their roles as EPs. Certain references to the practice of EPs revealed that various disciplinary structures influence the EP role, for example, practice frameworks, models and working for a broader organisation such as the Local Authority. These then had implications for how far certain knowledges, like neuroscience, could be accepted into the fold of EP work.

The next section will turn to consider limitations presented in this research and suggestions for future research:

5.3. Limitations and Implications for Future Research

The researcher has focussed on the views of a small group of educational psychologists. The data gathered from interview of ten educational psychologists has been extensive and vast, and the research needed to be selective with the data about how best to demonstrate the views. The research has attempted to offer some insight about EP views through the use of the discourse analytic tools deployed in this research. This section considers some

of the limitations presented in this research, and suggest areas of research possible in future.

A key task in this research was to present the various possible ways neuroscience was discussed by EPs and how these gave rise to certain subject positions and their implications for the possibilities and limits of social action.

A question that may arise about the research is to what extent commonality (among the speakers' views), as opposed to individuality (between the speakers' views) was explored in this research. Taking a social constructionist position, which stresses that reality is composed of multiple views, the researcher sought differences and variation between speakers' views rather than draw commonality among them. In addition, the approach of discourse analysis also challenges the notion of generalisation and objectivity in the data generated from participants. As Harper (2007), states, the approach is 'sceptical of the universal claims and taken-for-granted assumptions about knowledge (p. 40). Responses from participants are instead seen as distinct and unique constructs that are generated in the course of giving views (Potter and Wetherell, 1995). The focus was less on drawing on such common features, rather it was on the relationships between *each* speakers' constructions and how these linked to subject positions and their implications for social action. As the social constructionist regards language as a medium through which phenomena in the world is understood, there is also the acknowledgement that this language will vary across speakers, and this has been the focus of the analysis throughout.

<u>Selection of sample and representativeness</u>:

One limitation of this research could be seen to be in relation to the sample of participants. Those who took part, chose to do so, and these may have had implications for pre-formed and possibly, more favourable views about neuroscience. Two ways in which this was tackled, as discussed, was giving all EPs in the two services the free response task, and if they chose not to take part, they were required to give some description about their reasons for chosing not to do so. A large sample of sentence completion tasks were completed, and these could have been further analysed as discursive texts in

themselves. However, due to time limitations, this was ultimately not possible. Such analysis of data could have given a more varied representation of the sample of educational psychologist drawn from the two educational psychology services from where participants were recruited.

The researcher considered carrying out focus group interviews, but reviewed this method as having a transformational quality over the views of participants in the course of speaking (Breakwell, 2006). There was an interest in this research to look at how individual educational psychologists constructed the discursive object, neuroscience, without the influence of others' views. Focus group research, on the other hand could be valuable in understanding how educational psychologists negotiate their views with other educational psychologists, and collectively construct views about neuroscience. Also, given the transdisciplinary dialogue that is called for, there is a possibility that EPs could engage with multi-disciplinary teams, where EPs could hold cross disciplinary dialogues with other professional, academic or research communities.

It may also be argued that the researcher's presentation to recruit participants during an EPS service meeting may have influenced subsequent views of participating educational psychologists. The recruitment process prescribed no parametres on the sample of educational psychologists selected. (Willig, 2008). However, the researcher's own experience of working as a Trainee in educational psychology services, and reading literature, such as that of Mackay 2002, and Lunt and Majors, 2000, suggested that there would already be at least some variability in the way educational psychologists spoke about their roles. The researcher found it important to highlight to participants that there are currently debates that circulate about neuroscience. These then presented a rationale for engaging both interested and less interested participants, and encourage them to provide views. The researcher also found it important to familiarise herself as a researcher with the educational psychologists, investigating what could be perceived as a challenging area. As the researcher sought the authenticity of EP views, this seemed particularly relevant. As Breakwell (2006) states, at times 'the validity of data improves if the researcher is able to talk to participants before hand' (p. 76). By the researcher admitting

little knowledge about neuroscience, framing the research as a piece of exploration, it was hoped that an adequately reflective sample of educational psychologists was achieved.

Nonetheless, there was little exploration into whether there is an impact on the EPS settings or services on the subsequent views held by educational psychologists. This impact would be worthy of exploration. Of more interest to the researcher was the plurality of views presented. As the research was conducted in Local Authority educational psychology services, as opposed to for example, independent educational psychology services, it was hoped that this would enable some common themes to emerge in the discourse, for example, what impact the Local Authority had on the ways in which EPs worked for example. Future research could broaden into investigating alternative or independent educational psychology services, and how different ways of working could impact views.

It would have been interesting to invite EPs to more of a discussion about their training and experience. Certainly, initial stages of the interview, helped to 'locate' the particular speaker in their professional roles. That is information about the EPs' backgrounds and training were features of the interview, but relationships between these experiences and the views that subsequently developed were not given as much priority as was possible. Given the changing identity of profession, as highlighted in publications such as Mackay (2002), it would be worthwhile if research looked at whether greater interest in neuroscience was linked to specific areas of specialisation or training.

Epistemological Stance

Foucault has been often viewed as taking a political stance, against widely accepted beliefs and practices. It was difficult for the researcher to adopt a fully Foucauldian stance. As Langrdidge (2004) puts it, most Foucauldian Discourse Analysts do position themselves politically, and make this explicit in their analyses. However, it was not within the researcher's interest or aims to take a political stance, but simply expose some of the views that circulate in EP discourse. Moreover, the interest was not, as in the case of Gallagher (2007), to

offer an alternative or counter-discourse to the profession. This would inevitably lead to a set of critical views of the profession. The aim in this research was to raise awareness of neuroscience, but from a subjective point of view, look at the profession in terms of hopes and possibilities, rather than view disciplines as 'oppressive forces' that Foucault (1982) seemed to refer to when talking about discipline and institutions. Foucault has highlighted for the researcher that disciplines are invariably 'governed' by structures, and these in turn, will have an impact on how certain discourses are made possible, while others are repressed or kept silent. In the researcher's view, individuals can negotiate with the constructs that they drawn on, so that available discourses become broader and more included with those that currently circulate.

It can be argued therefore that the research did not undertake a Foucauldian Discourse Analysis in its fullest sense. Willig (2008) highlighted the six steps of analysis used in this research, but also cautioned, that Foucault was also interested in the relationships between discourse, history and governmentality, including the incorporation of approaches such as archaeology or geneaology. These terms refer to tracing the historical development of a particular in the context of a particular time and location. An attempt at Foucauldian geneaology was initially attempted by the researcher. However, due to word length limitations, and deviation from the focus of the research, these sections were not included in the main body of the research. The passages of a geneaology are included in Appendix N. This begins to show that neuroscience has historical links with psychology and philosophy, and has been embedded in different contexts over time. In the context of socio-historical discourse, neuroscience can be seen as an 'active' term, taking on different meanings, ideas and references. The interviewee with [Elsa], for example referred to neuroscience as developing knowledge, and this reference seemed to be likened to Foucault's idea of archaeology or an interrogation of the way knowledge develops. This reading about the historical evolution of neuroscience would help gain a full appreciation of the way knowledge takes shape, and more importantly, how it gained the particular position that it occupies now in educational psychologists' discourse. Future research would benefit from reading topics such as neuroscience through more of a geneaological analysis.

5.4. Contribution of Research to Educational Psychology Theory and Practice

There are many areas that are associated with the field of educational psychology, and this research has not aimed to overlook the presence of different areas of enquiry, understanding and research in educational psychology. Consistent with the variation of constructions emerging from the current research, neuroscience seems to present one among other possible frameworks of knowledge that the EP can draw upon. Furthermore, the current findings about neuroscience in terms of actual application have been found to be limited (Hall, 2004). In the assertion by Byrnes & Fox (1998), educational psychologists need to be discerning and cautionary about the actual implications of brain research. As this research took a constructionist view, the research looked at how educational psychologists formulate views about neuroscience, rather than offer evaluations about neuroscience research or applications.

This research was an opportunity for this group of EPs to speak about their professional roles. The researcher reflected on what the professional of educational psychology is and how EPs define their work. Responding to the topic of neuroscience gave EPs an opportunity to reflect on what the profession is as well as what it is *not*. Whether it is about reducing young people's problems into a single explanation, or about different possibilities that are presented, these were subsequent questions which were of equal interest and importance. In the case that there are different possibilities, under what circumstances or *conditions of possibility* can thinking about the brain be more appropriate in the context of an EP's work?

Having paved a little of the pathway for understanding educational psychologists' views about the area of neuroscience, this perhaps then makes it easier to interrogate the discursive constructions that have been dominant in educational psychology. The reference to frameworks and models in educational psychologists' work has been notable (Kelly, 2008), and in the discourse analytic view, can be seen to be integrated within the *available meanings* EPs draw on to make sense of their professional roles. Neuroscience

can be constructed, for example, as compatible or incompatible with the models that EPs typically use. Equally the proposal can be made to extend such models to incorporate more biologically oriented models. However, the multiple perspectives that have been presented in this research begin to illustrate that educational psychologists do not necessarily accept one single theoretical framework. References were given by participants that many different frameworks exist, and considering these are very much determined by the types of work presented, levels of interest, and the personal theoretical stance taken by the educational psychologist.

One contribution this research can make is considering the transdisciplinary dialogue that is currently proposed. The profession can perhaps use applications of psychology to contribute to one level of the 'jigsaw' that adds to neuroscientific thinking. (Tommerdahl, 2010). Makcay (2002) also suggests the central role EPs can occupy in research. This could in turn contribute to the various area of research needed in neuroscience. There have been models proposed of how neuroscience can be transmitted to educational contexts. Tommerdahl (2010) argues that to consider the applicability of neuroscience and education 'many levels of research are required' (2010 p. 98). In addition, Tommerdahl contends that work will be most useful if done in a multilevel discussion. It has been suggested that educationists could feed into cognitive neuroscience research through the providing behavioural information on children and by clarifying the questions they find most pressing (Geake, 2005). Some of these questions might involve the recognition of learning difficulties, and how much variation exists between 'how typically developing individuals learn' (Tommerdahl, 2010, p. 98). Mackay (2002) also talks about the future role of the EP as being linked to research. He proposes that 'research which will be most valued in society in the future is research which educational psychologists are almost uniquely qualified to carry out' (p. 249) Such broader discourses that are circulating seems to suggest that the profession of educational psychology could be key to contributing to the research basis of neuroscience.

Finally, the transdisciplinary focus on neuroscience also requires that other professions *understand* the roles of others, occupying dissimilar professional roles. Understanding how different frameworks influence EPs, and how EPs

themselves are governed by broader structures would perhaps create greater appreciation of the roles of EPs among other communities. This would also provide some reasoning as to EPs' readiness to engage in broad agendas, for example the agenda which links education and neuroscience.

Using Discourse Analysis

One hopeful contribution of this research is that it endorses discourse analysis a particularly valuable research tool. As Billig (1997) states, 'Discourse analysis is more than following procedures for collecting and categorising data; it involved a theoretical way of understanding the nature of discourse and the nature of psychological phenonmena' (p. 43). It is embedded within the paradigm of social constructionism, and therefore could be well integrated and accessible as a research tool for educational psychologists (Kelly et al, 2008; Wolfendale, 1992). The approach has been also particularly relevant in the investigation into giving views. Discursive Psychological enquiry, as used in this research, has hopefully shown that there are many ways in which phenomena can be understood and interpreted. One liberating impact of analysing discourse is that, discourse does not *determine* things, there is always the possibility of resistance and indeterminacy. The point that neuroscience is not just construed by EPs as deficit model, it also considered as knowledge that could develop and advance, provide a basis, or help to come to an additional level of understanding.

5.5. Reflexivity

Reflexivity is a means by which the researcher accounts for him or herself in research. Reflexivity enables the researcher to interrogate their actions and choices in the course of research. As Oliver (2005) states, 'when we practice reflexivity we make choices about how we will think and act. We become responsible and accountable for our choices, our actions, and our contributions to a relational system' (p. 3). Willig (2008) distinguishes between personal reflexivity and epistemological reflexivity. While the first refers to how the researcher's beliefs and practices could inform research, the other refers to the assumptions that are made in the course of carrying out the research.

In reference to personal reflexivity, the researcher went through a process of ongoing reflection throughout the development of research. This involved questioning her own beliefs and practices in relation to the role of an EP in Training and in relation to the profession of educational psychology. From the time of submitting the proposal in Year Two of the doctoral course on which she was placed, many experiences were undergone, such as being on placement, and 'living' the role of an EP in practice. These experiences somewhat had an impact on the implications of this piece of research. The researcher was exposed to various models of EP working and different frameworks of practice which informed her work.

The research greatly enabled the researcher to take a curious stance about neuroscience, while neuroscience was used as a topic to understand more about the profession, at a particular point of time when the profession was going through its own state of change and development. There was, in the researcher's experiences talks about restructuring of local authorities, and remodelling the types of work EPs can offer. Such change and uncertainty of roles was also reflected in readings in upcoming journals and articles. It was notable that talking about within-child medical factors were largely incompatible with the Trainee's experiences on placement, as the focus was greatly on applications of educational psychology and references to these experiences were somewhat reflected in the discourse of EPs gathered for this research.

While attending conferences and seminars on topics of neuroscience, at times there was a certain ambivalence and scepticism about the area, and what it can offer. Neuroscience was certainly viewed as linked to the discourse of reductionism, loss and deficit, rather than development and progress for the individual. The researcher reflected on how some communities, or *enthusiasts* readily accepted neuroscience, while others were highly dismissive or sceptical. Exploring ideas about neuroscience was therefore a way to critically engage with neuroscience. It enabled the researcher to gain a richer view of the profession, and reinforced the need to apply different level of knowledge to her work. The social constructionist position greatly enabled the researcher to

engage with the debates about neuroscience in an exploratory way, and this in itself aided the learning process.

In terms of interviews, respondents were given time to reflect on the interview and were given feedback for their views. The researcher also had the opportunity to provide thoughts in engaging in the interview process. The interviews, did have an element of a change quality for most EPs as noted from their responses at the end of the interview. The interviewees stated for example, they became more aware of their views as they spoke, and this highlighted for the researcher the constructive quality of discourse, and reinforced the value of looking at views through a discourse analytic lense. Within the interview the researcher tried as much as possible to establish a positive rapport with participants by asking them to clarify some basic information and then by adopting a conversational approach. For the purpose of reflexivity, the researcher's role in the process of research was continuously reviewed. A research journal was kept where the main developments and changes to the research was documented for personal reference.

Having highlighted some areas linked with reflexivity, the researcher turns now to consider some concluding remarks.

5.6. Conclusions

This research has been driven by the researcher's awareness of the growing interest in neuroscience within the educational field. Neuroscience is claiming to shed light on various areas of learning, such as literacy, mathematics and developmental difficulties (Blakemore & Frith, 2000). The call for educational psychologists' involvement in the transdisciplinary efforts in neuroscience have been highlighted. At the same time, the topic of neuroscience has been subject of debate and controversy, particularly about how far the brain can inform our understanding of education and social processes. Previously, research by Pickering et al (2007), drew perspectives from educators about the area of neuroscience, specifically about how neuroscience could be applied in the education context. However, the methods used by Picerking et al (2007) pre-

supposed that educational professionals are interested and engaged in the education-neuroscience agenda. The present study has aimed to take a step back from such research, and question instead how views about a particular phenomenon such as neuroscience is formulated and constructed.

The researcher was particularly drawn to the variation of views presented in the literature, suggesting that there would likewise be a set of varied constructions about neuroscience (Parker, 1995). A discourse analytic methodology was adopted. Informed by the methods of Discursive Psychology, and Foucauldian Discourse Analysis, the researcher set out to explore how a few members of the educational psychology discipline discursively constructed the role of neuroscience in their practice.

As Billig (1991) states, each person has a variety of voices, and rather than be neutral, individuals draw on various repertoires of language. By asking EPs to talk about the area of neuroscience, it was hoped that some of these variations would become apparent. It was hoped that the educational psychologists' discursive practices would help the researcher understand what factors may enable or limit educational psychologists' engagement with the area of neuroscience. This research has hoped to shed light on some the contradictions and tensions that appear to be influencing EPs views about neuroscience.

A specific focus on the research questions enabled the researcher to explore the variety of constructions drawn on by EPs. Neuroscience was, for example seen as something that challenged social models with which EPs work, as well as an additional framework. It has also been seen as knowledge that is developing and changing. Certain subject positions were adopted by the educational psychologists interviewed that were linked to these constructions, such as EPs being free and autonomous, distinctive in their roles, or adopting stances such as social constructionism. In addition, educational psychologists' constructions and subject positions were also linked to their practice as educational psychologists. Responding to neuroscience, for example, enabled speakers to interrogate their roles as EPs. A combined focus on discursive practices as well as discursive resources therefore lead to a detailed exploration

of the research questions, from which the researcher could consider some implications for future.

Overall, neuroscience can be viewed as a newly emerging area of knowledge, whose value for educational psychologists has been endorsed in the literature reviewed. Research in neuroscience is claiming to shed light on many different areas with which educational psychologists typically engage, such as mathematics, literacy, and developmental difficulties such as Autism, and some areas of possible relevance have been highlighted in the literature review. These areas are already topical in the discursive practices of educational psychologists. However, it was notable that the views of educational psychologists have been missing from these developments.

Further developments could well involve the future participation of EPs, for example, by identifying areas of learning needs and suggesting pathways for neuroscientific research. Developments in neuroscience knowledge could therefore be a resource on which educational psychologists draw to inform their practice and theoretical understanding in addition to the rich frameworks they already use. Educational psychologists have also been implicated as a potential interface between neuroscience and education. Drawing on the notion of 'building bridges', educational psychologists have the potential to create cross-disciplinary dialogues, for example, between teachers and scientists, and can be informed by their knowledge and understanding of social and cognitive processes. Such 'building of bridges' has been a dominant theme in the literature reviewed.

It is hoped that through an analysis of educational psychologists' constructions about neuroscience, a greater understanding can be gained of the different constructions available in the social world of an EP. One way may be (as realised through the interactive qualities in the interviews) to re-specify the constructs (Edley, 2001) that educational psychologists use, by considering different theoretical frameworks, knowledge and understanding. From this, a range of possibilities can be mapped out about the potential for the professions' future engagement with this emerging area of knowledge.

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Appendix A: Literature Search

EBSCO (Databases searched):

- PsychArticles
- Psychinfo
- ERIC
- Academic search Complete

Title Searches (all sources 1990 to 2012)

Title Searches	Number of Records	Relevant Papers/Studies
'Education' & 'Neuroscience'	184 (EBSCo only) 1125 Full Database search 1088 (1990-2012 filter) 128 (Thesaurus Terms: Neuroscience, Education, Learning)	Purdy (2008); Morrison; Tommerdahl (2010); Stanovich (1998); Mayer (1998); Byrnes and Fox (1998); Schrag (2011); Samuels (2009); Howard-Jones (2007;2008);
'Learning' & 'Neuroscience'	115 (EBSCo only) 1410 Full Data Base search 113 (Thesaurus Terms: Neuroscience, Learning	Goswami (2004); Goswami (2008); Bakhurst (2008); Geake and Cooper (2003)
'Educational Psychology' & 'Neuroscience'	14 (EBSCo only) 39 (Full data base search) 11 (Thesaurus Terms: Educational, Educational Psychology, Learning, Cognitive Neuroscience)	Tommerdahl (2010); Stanovich (1998); Mayer (1998); Byrnes and Fox (1998)
Educational Psychology Frameworks – [keyword]	15 (EBSCo only)	Kelly (2006); Lyons (1999)
Educational Psychology Models	30 (EBSCo only)	Hagstrom (2007) US; Leadbetter (2000)
Educational Psychology Discourse	17	Gallagher (2007)
Educational Psychology Views	43	Scheurman (1993) Brooks et al (2003) Hart (2010)

Appendix B: Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
Scope	**Scope**
Education or Learning related articles expressing views advanced towards cognitive, educational and developmental neuroscience.	Not focused on education or learning.
	Adult education
	Social Work related
Studies linked to	Focussing on values, for example, religion
Studies seeking views of educational psychologists only	Teacher Training programmes in neuroscience.
UK Studies (broaden search to include US studies if not many searches derived)	Based in other disciplines, such as 'management'
Time & Place	Specific aspects of non-academic related education, such as physical education.
Studies written in English	Studies other than in mathematics, literacy and early development.
Studies produced / published after 1990	Incorporating other areas of neuroscientific focus, such as genetics or biochemistry
Journals of education, philosophy and educational neuroscience.	**Time & Place**
Study Type	Studies not written in English
Articles linked to education	Studies or literature based in other settings, such as clinics and hospitals.
Articles linked to Educational Psychology	Disciplinary Policy / Law / Social Policy related studies.
	Journals pure-science related (with limited commentary on implications for education)
	Studies produced / published before 1990
	Study Type
	Quantitative studies not seeking the views of education professionals.

Appendix C: Sample Letter to Principal Educational Psychologist at EPS

Researcher
Mill Lane
Tel : 82367

E-mail: xxx

EDUCATIONAL PSYCHOLOGIST
EPS CHILDREN SERVICES
CABBAGEBURY
1 STREET
MILL LANE ROAD

Re: Research in Neuroscience

Dear Sir/Madam

I am a Trainee Educational Psychologist studying at the University of East London, now completing the second year of my Doctoral Programme.

As you may be aware, as part of the completion of our Doctorate, Trainees must undertake and contribute to research.

My area of interest is exploring educational psychologists' views about the topic of neuroscience. As part of my research, I wish to carry out two pieces of work with a number of educational psychologists. I wish to gather qualitative responses, which will involve the following:

1) Asking EPs to give their written views about the topic of neuroscience by responding to 3 short sentence completion tasks. This will take no longer than 10-15 minutes (attached example is given).

2) Request EPs' participation in a formal interview lasting around 45 mins to explore their written views (as given above) further. Both tasks can be undertaken at your EPS at times convenient to EPs.

This is a brief outline of the main tasks. I would consider participation at any stage of this process of huge value and contribution to my research.

I have attached with this e-mail and letter:

- A Participant Information Form which provides full details of the research aims and data gathering process.

- The short Sentence Completion activity which should take no longer than 15 mins to complete.

I would like to assure you that this research has been ethically approved by our university ethics committee according to the BPS Code of Ethics for Research with Human Participants. Therefore, I will ensure that issues such as participants' confidentiality and anonymity are adhered to.

Finally, I thank you for your attention, and really forward to the possibility of part of this research taking place at your EPS.

Yours faithfully,

T.Hussain

Tamara Hussain

Trainee EP, UEL

Appendix D: Participant Information Sheet

Research in Neuroscience
Participant Information Form

Doctorate in Educational and Child Psychology
University of East London
Romford Road
Stratford E15 4LZ

University Research Ethics Committee

If you have any queries regarding the conduct of the programme in which you are being asked to participate, please contact
Dr Mark Fox, Programme Director of the Doctorate in Educational and Child Psychology
The University of East London, Stratford Campus, E15 4LZ
(E-mail: M.D.Fox@uel.ac.uk Tel : 020 8223 4680)
Information about ethical approval for this research can be obtained from the
Secretary of the University Research Ethics Committee, Mr Merlin Harries, Admissions and Ethics Officer, Graduate School, University of East London
4-6 University Way
London E16 2RD (Tel 020 8223 2009, Email: m.harries@uel.ac.uk)

The Principal Investigator(s)
Tamara Hussain
07881 814 109
th2524@gmail.com

Consent to Participate in a Research Study
The purpose of this letter is to provide you with the information that you need to consider in deciding whether to participate in this study.

Project Title
Exploring Educational Psychologists' Views about Neuroscience

Project Description

The research aims to gather your views in two stages.
During the first stage, you will be given a Sentence Completion Task sheet which prompts you to give your written views about neuroscience.
Following this stage, you then have the option of participating in a 45 minute interview in which you will be asked to give your views in more detail. The sessions will be recorded for ease of transcription of the data at a later stage.
If you would like to take part in this second stage of the process (interviewing), you will be required to complete your contact details, and sign and date the end of the Sentence Completion task sheet. The researcher will then contact you to arrange a suitable time in which the interview will take place.

Confidentiality of the Data

The data from the taped sessions will be used only for research purposes. The cassette on which the recordings will be made will be kept confidential, and no names of any participants will be included on any of the transcripts, any part of the research project, or divulged to any other individual.

Location

The data gathering will take place in your Educational Psychology service. You will be given up to a week to give your views on the task sheet. If you would like to take part in the 45 minute interview, please sign and date the sheet, and you will be contacted at a suitable time for the interview, which will also take place at your EPS.

Disclaimer

You are not obliged to take part in this study, and are free to withdraw at any time before or during the interview. Should you choose to withdraw your consent from the study, you may do so without disadvantage to yourself and without any obligation to give a reason.

Researcher details

Should you require any further information about the research, please feel free to
contact myself, Tamara Hussain, as Researcher on the following number:
07881814109
or alternatively, on the following e-mail:
th2524@gmail.com

Appendix F: Sentence Completion Task

Exploring Educational Psychologists' Views about Neuroscience
A Sentence Completion Activity

Doctoral Research in Educational and Child Psychology
Researcher: T Hussain
Data Collection Task for Participants

Dear Participant,

Please take a few minutes to read before commencing the task.

This research explores Educational Psychologists Views about Neuroscience, and invites you to give your views.

Neuroscience has been the topic of growing debate over the past two decades. This is particularly with regard to its application to education. There are those who view neuroscience 'unfavourably', saying it has little or no relevance to education, and those who view neuroscience 'favourably' saying that it is highly relevant. Both views justify their positions in various ways.

The aim of this research is to explore where Educational Psychologists stand in this debate. Do Educational Psychologists view neuroscience as relevant to their discipline? Can neuroscience help inform Educational Psychologists' work?

The following are 3 sentence completion tasks which prompt you to give your views. This should take no longer than 10-15 minutes depending on the detail you wish to provide. Please note that there are no correct or incorrect responses. The researcher is just seeking your views.

Yours thoughts and time on this task would be greatly appreciated.

Following this task, there is a question asking you whether you would be willing to take part in a 45 minute interview to explore your views further. This will a major contribution to the present research and would be greatly welcomed. If you would be willing to take part in the interview, please sign and date, and give your contact details in the section below.

Thank you for your contribution.

Tamara Hussain

Tel : 07881814109

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Appendix F cont.: Sentence Completion Task

Sentence Completion Task

Please firstly provide your length of service as an Educational Psychologist (in years)

_____

Please now complete the following sentences.

Neuroscience is……

My views about neuroscience are that……..

Educational Psychologsists' views about neuroscience are that……

Please tick ☐ **Yes, I am willing to take part in an interview to discuss my views further.**

Signed _____
Date_____

Contact details (eg. e-mail/ phone) _____

No, I do not wish to take part in the interview because ----------

Appendix G: Presentation to Educational Psychology Service

Outline of Main Points Presented

- The researcher explained that as a Trainee of her Year 3 Doctorate programme in Educational and Child Psychology, she was required to undertake a piece of research.

- As part of this, the researcher wished to explore the views of educational psychologists about the topic of neuroscience.

- The researcher's interest in this area has arisen from the debates about neuroscience which have been circulating mainly in educational literature.

- Neuroscience is claiming to provide an understanding of different aspects of learning.

- However, the researcher noted that there was controversy about neuroscience and its links with education. Various people from different academic and professional communities have responded to the links being made.

- For example, some of these communities have viewed neuroscience favourably, others unfavourably.

- The researcher was particularly drawn to certain debates about neuroscience, and noted that the voices of the profession of educational psychology were missing in these debates. This directed the researcher's interest in exploring educational psychologists' views about neuroscience.

- This research does not seek EPs' knowledge about neuroscience, just their views. The question is whether neuroscience is seen as having a role in educational psychology. The researcher stated that she was curious and uncertain about educational psychologists' views about this topic area.

- This presentation was therefore carried out to invite educational psychologists to respond to this area.

- The data gathering approaches were then explained to the EPs. The researcher explained that two approaches of gathering data were proposed. One of them was a sentence completion activity consisting of 3 sentence starters. (These were read out to the

participants). Participants would be distributed these sentence starters, and asked to take 10-15 minutes to complete them. It was highlighted importantly, that there would be no right or wrong answer expected in the sentence completion activity. EPs were just being asked to give their views.

- The researcher highlighted next, that at the end of the activity, there was a written question asking EPs whether they would be willing to take part in a formal interview for up to 45 minutes to explore their views further. If so, a box could be checked next to this question, and the EPs' contact details would need to be included. The researcher would then contact the EPs who chose to take part and arrange a time convenient for them for interviews.

- The researcher invited any questions related specifically to the task.

Appendix H: Sample Sentence Completion Task

Sentence Completion Task

Please firstly provide your length of service as an Educational Psychologist (in years) Year 3 Trainee Educational Psychologist

Please now complete the following sentences.

Neuroscience is……

In broad terms it is the study of brain structure and functioning. Historically it has concerned studies of individuals with acquired brain injury to map what areas of the brain are designed to do.

You use the term history, any reason you chose that term in the sentence completion..?

My views about neuroscience are that……..

Neuroscience has the potential to help us understand the complex neurology that could underpin key areas of psychological development such as cognitive, social and emotional development. For example, recent developments with regard to the neural functioning of individuals who have autism spectrum conditions have highlighted that certain structures in the brain may be impeding their ability to empathise with others – such as mirror neurons. This information can support educators to understand aspects of 'why' such young people find social communication difficult. This thinking can be expanded to working with all young people experiencing social communication difficulties. Importantly, this knowledge and understanding can inform practice that supports the development of these particular skills. Likewise research illustrating functioning in brains of young people with other Special Educational Needs can give insight into areas of difficulty with learning and generalising skills such as memory functioning. This can inform targeted learning support. Other areas of significance to me concerns developments in our understanding of the plasticity of the brain in terms of recovering from injury but also from traumatic events that may have engendered attachment difficulties. Regarding attachment, knowledge of plasticity, tendency towards flight/fright responses can help educators to provide an environment and experiences that support the brain to form more positive and effective ways of functioning, which will support all aspects of development.

..going back to the practice and knowledge so you think that incorporating neuroscience in EP work is relevant both their knowledge and their practice, would you like to expand on that?

Use of the term plasticity and attachment explored..

Educational Psychologists' views about neuroscience are that……

I would suggest that views about the relevance and utility of neuroscience vary. Some may feel that it can provide insight into underlying causes of difficulty that are apparent in learning, behaviour etc; and informing practice that will address the areas of underlying need. Others may feel that focus on the brain could be dangerous in limiting educators' efforts for helping young people who are considered to have 'brain difficulties'.

Can I explore your use of the terms 'dangerous and limiting'?

Please tick 👍 Yes, I am willing to take part in an interview to discuss my views further.

Signed [Phil] Date 29/04/11

Contact details (eg. e-mail/ phone)

Appendix I: Interview Schedule and Researcher's notes

Sample Questions to the Interviewee

PART 1: Initial Orienting Statements:

- This interview is an exploration of your views, rather than your knowledge. You may however, draw on your knowledge about neuroscience, to help inform your views.

- I will try to formulate questions, comment on or paraphrase the things you say to clarify my understanding. Please feel free to clarify any point if you feel the question or comment does not truly reflect your views.

- I am seeking the authenticity of your views. That is, that your comments and things you say, reflect your true views about neuroscience.

- At the end, we will have a session of debriefing, where I would like to speak about my thoughts about the interview.

- The interview comprises a reflexive section built into the end, where I will ask questions on how you felt the interview went. For example, was it what you expected from this interview, anything easy difficult, and anything you feel you may have learned…?

Such questions helped orient the participant to the interview process, and as stated by participants (particularly during the pilot work), made them feel prepared about the types of questions that would be explored.

The semi-structured interview schedule was composed of three sections:

Questions related to participant background and areas of interest.

- Can you describe your early training as an EP? What topics interested you?

- Can you describe your current work as an EP?

Commencing with this line of questioning again helped EPs relate their own experiences and make connections between these and the topic of neuroscience. Moreover, there were specific connections made between these initial questions and the later exploration of EP views:

- Now coming to the topic of this interview, can I start by asking you, what brought you to this interview?

- Can you tell me your first thoughts when you became aware that a Trainee EP was researching EP views about neuroscience?

The researcher found it helpful to use terms and phrases arising from the Sentence Completion Activity. This informed a second phase of the interview. This involved an exploration into the terms, phrases (language) the EP used to give their views.

- Can I explore with you the definition you gave about neuroscience? From where was this derived? For example, textbooks, experience, your knowledge?

- You mention the following term when you gave your views? (The researcher refers to and clarifies specific terms and phrases in the sentence completion activity). Can you tell me a bit more about your choice of this term?

The final set of questions involved a phase of reflexivity about the interview. It also involved debriefing the participant to validate some of their contributions during the interview. For example:

- How did you feel about the interview?
- Is it what you expected? Did you find any aspect of it challenging?
- Have you learned anything through the process?
- Are there any further comments you wish to make?
- As researcher, my views about the interview were that…

The researcher therefore ends with some feedback about their understanding about the interview process, highlighted what was notable and interesting about the participants' contributions.

Appendix J: Ethics Approval Form

EXTERNAL AND STRATEGIC DEVELOPMENT SERVICES
uel.ac.uk/qa

Quality Assurance and Enhancement

MRS TAMARA HUSSAIN
5 FULTON COURT
4 HARSTON DRIVE
ENFIELD
MIDDLESEX
EN3 6GN

Date: 5 May 2011

Dear Tamara,

Project Title:	**Module 8 Research: Data Analysis**
Researcher(s):	**Tamara Hussain**
Supervisor(s):	**Mark Fox**

I am writing to confirm that the review panel appointed to your application have now granted ethical approval to your research project on behalf of University Research Ethics Committee (UREC).

Should any significant adverse events or considerable changes occur in connection with this research project that may consequently alter relevant ethical considerations, this must be reported immediately to UREC. Subsequent to such changes an Ethical Amendment Form should be completed and submitted to UREC.

Approval is given on the understanding that the 'UEL Code of Good Practice in Research' (www.uel.ac.uk/qa/manual/documents/codeofgoodpracticeinresearch.doc) is adhered to.

Yours sincerely,

Merlin Harries
University Research Ethics Committee
Email: **m.harries@uel.ac.uk**

Docklands Campus, University Way, London E16 2RD
Tel: +44 (0)20 8223 3322 Fax: +44 (0)20 8223 3394 MINICOM 020 8223 2853
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Appendix K: Transcription Notation

Transcription Notation

The transription glossary is a modified version of the system developed by Gail Jefferson (2004). Below the transcription symbols are described in detail:

Notes:

In the body of the research, line numbers appear at the end of each excerpt quoted.

While initials of each speaker are not noted, the interviewer's speech appear in italics to differentiate this from the respondents' speech, which appears in regular font.

Timing

(.) (1.5)	Pauses are shown in tenths of a second in brackets. If pauses are shorter than one fourth of a second, a dot enclosed in brackets indicates such a "micropause".
>text<	Arrow brackets that point towards the text mark talk delivered at fast pace.
>>text<<	Double arrow brackets mark talk delivered at an especially quick pace.
<text>	Arrow brackets that point away from the text mark talk delivered at slow pace.

Doubts and comments

Special symbols indicate doubt about what is said, and there are symbols to mark the transcriber's comments:

(what)	It cannot be heard whether 'what' is being said or not.
( )	It cannot be heard what is being said.
((nods))	Comments on what happens or how something is done or said.

Sounds

No phonetic transcription has been used, but there are signs in order to show some of the sounds:

so-	A dash indicates the sharp cut-off of the prior word or sound.

Intonation, stress, volume

emphasis	Underlining indicates speaker emphasis.
emphasis	The more letters underlined, the more speaker emphasis is there.
↑high	Pointed arrow upwards indicate a marked rising intonational shift.

↓low	Pointed arrow downwards indicate a marked falling intonational shift.
↓low word↓	In some places arrows are placed around a longer piece of talk that is pronounced with especially low (or high) intonation.
°quiet°	Degree signs are placed around words to mark low volume.
°°quiet°°	More degree signs mark very low volume.
LOUD	Capital letters indicate high volume.

Appendix L: Sample Interview Transcript

Appendix L: Sample Interview Transcript

Speaker [Elsa]

Thank you very much for taking part in this interview, can you tell me how long you have been practising as an EP?

Um (0.8) since 1994 which is about 17 years… yeah

Can you tell me a bit about what brought you to be an EP?

Well I was a teacher um, and (.) I was interested in psychology and it seemed to be the next step, I don't have the usual background, I didn't know much about it really before I got into it aah (.) but I think it was just an interest in children, I enjoy working with them, talking to them and that sort of thing and an interest in psychology seemed to go very well.

Can you describe your first training course as an EP? What kind of things interested you?

I think it was more orientated towards, >not so much about testing or anything like that which was quite limited< it was more about the SOCIAL aspect of learning and social psychology I think was in the forefront (.) but obviously it did follow the BPS course, but hat seemed to be a lot about negotiation and working with other people to achieve ENDS for children.

You're mentioning about social context and saying that it interested you a lot….

I ↑found my course quite inspiring in >lots of ways and it made think < and (1.5) it was quite different, mean when you are a teacher you have an idea of what EP's are like, you have a limited knowledge in the START but um (1.5), you don't really have many conversations with them so (1.2) it was quite much more interesting than I expected it to be even (*laughs)*.

What was your initial expectation about the training as an EP?

…that it was going to be very difficult and very busy because it was a year's course unlike the doctorate course now, aah (1.8) um I thought there would be more subjective psychology because I DONE my

These are initial orientating questions, enabling the speaker to become familiar and comfortable with the interview situation. Topics covered include early experience and training as an EP, and current role.

At present, if later references to neuroscience are relevant to this stage of the interview then they may be a focus for further exploration.

undergraduate psychology, I did B Ed and then educational psychology um (1.5) so I hadn't really done that sort BROAD undergrad course, a lot of people might have done a BA or BSC in psychology so (.) so I expected that there would be more psychology involved. Rather than using psychology, like moving ON with psychology…

A bit more of what you experienced in your under grad degree..

- but I understand why I didn't get that but thought it would be MORE psychology -

- Ok

I suppose It was assumed wasn't it, °(well I don't know if you found that..)

Have you always been with the service or have you always been around?

I did a year in Camden

- right

- as a temporary job and then moved to Barnet (1.1) >not with any intention to say this long< but it just happened.

Ok.. thanks, I now I want to move on to talk about the particular interview, I would just like to ask you your first impressions when you discovered an EP in training was investigating EPs' views about neuroscience.

What were your first thoughts?

↑I thought it was interesting because one of our trainees here was mentioning that he was looking for a case. I thought I must speak to him and find out more about it because I am curious about it. Like everybody I'm not really sure how it works. I suppose it's more a (1.1) MEDical model that is my *impression about psychology and neuroscience* and I have been trained not to argue against that.

I guess it leads on to my next question. Why you chose to take part in this interview?

STAGES 1 and 2 of ANALYSIS

1) *Constructions* and *Discourses*.

I have underlined some constructions of the term neuroscience.

Here I note that medical model is used to describe both psychology and neuroscience, as if synonymously. This is a good example of *discourses* or contradictions when making reference to a single discursive object.

Of course I like to be helpful but I thought it would be interesting, I think it is really good to do that research and publish it in one of our journals and for people to start thinking about it.

Can I explore that a bit more, you feel that people or EP's should start to think about it more?

I think people should at least KNOW about it and some of the issues. I suppose my impression it is (1.2) one of these things that one **should**n't go down the (.) full route and say that is what we do (1.2) hopefully it will inform SOME of the things we do and underpin things. For example if you make a recommendation you should TRY to do something with a child in school, you should except that there would be some neuro-psychological ef**fect** on that. >You don't know what it is because you have no way of checking it would work< on the behaviour but knowing you have got a little bit of **pow**er and more force to your recommendation to what you are doing.

You are mentioning power, force and knowing. Is knowing something that you feel is quite important to EP's How far do you think this is important for an EP?

↑I think it probably is important for any professional that what they DO has some **basi**s (1.8) and as much FACT as you can discover about it (0.8), you should look at the history of how knowledge develops. It is a lot about beliefs, we believe certain things. I was watching a programme abut humors and that medicine was about humors >but we know that it doesn't exist anymore and has been replaced with something else< but we got a bit more information about it because people have been able to cut up bodies and done things with bodies to discover thing. We know that in another (1.5) 50 years there might well be another revolution in looking at (1.2) the medicine or psychology.

Would that be shared by other EP'S?

↑I don't know I have not heard anybody having much interest (1.2) nobody rushes in and says they have read a wonderful article by someone about neuropsychology.

Constructions and *discourses* cont:

Elsa seems to be saying that there is no need (for EPs) to know fully about neuroscience. She captures this in the phrase 'going down the full route'

Another construction of neuroscience as a topic that produces 'power' and 'force'

Enabling and Limiting Action:

Elsa mentions beliefs and that knowledge is made up of 'enough facts that you can discover about it'. She qualifies this by giving an example about humors. Elsas' actions therefore will be guided by beliefs.

I believe that this particular point is salient in the speakers' reference to neuroscience and therefore has been chosen to constitute a 'discursive site'. In other words, the reference to history seems to 'epitomise' the speaker's views about neuroscience; that neuroscience is in some ways the product of history. This is one example of how a discursive site is chosen, ie. How words and phrases characterise the speaker's central view.

What other areas interested you most or what work have you found interesting.

I think I have been more interested in looked after children. I was an EP for looked after children for quite a few years and I found that very interesting. If I have looked at neuropsychology it would have been in that context (1.2) trauma, brain scans. I can say I have looked at it a little, flicked through an article. But I find this area interesting. ↑At the same time I am sceptical, I don't want to shut off routes for people to improve. I wouldn't want the fact that somebody has done a brain scan and found that there is so much brain damage that you can't work with children (.) or (.) people. I am worried that it shuts off because they say "that is it" and we have to work with "that-is-it" rather than the whole thing of expectations. People have limited expectations and you want the expectation to go that much ↑further.

Am I right in saying that are you suggest that working with and thinking about neuroscience can limit the potential to do more work or make views to reliant on it?

I think it is valuable to be **sceptical** as well. When we do (1.2) assessments you are looking for different pieces of information. (What a child is like at home) at school, with friends, all different contexts to get a whole **picture**. I feel that it is one piece of the picture and not the whole picture.

You mentioned knowledge in your sentence completion task.. EPs should have knowledge, do you think it is important for all EP's to have knowledge in this area …?

I'm not really sure I find (1.5) that the whole profession of educational psychology is so di**verse**. It's about how people see the world and how you do your job can be quite different; I think that diversity can be either a weakness or a strength but it means that people get a different view and you are not necessarily going to get the same thing. There are probably some things that we all (1.5) meet on but it's nice that there are people looking at things from another angle.

Returning to looking at constructions about neuroscience, again reference to neuropsychology.

The term 'shuts off' maybe euphemistic and DP is used to analyse how this phrase functions and what it achieves for the speaker.

Step 6: Subjectivity

This is a good example of the speakers' subjectivity in the interview. If subjectivity describes the thoughts, intention and feelings, then here the speaker expresses the value of being sceptical about neuroscience knowledge.

Note in Line 96 she uses the term 'worried', as if reflecting a cautious position.

Step 6 cont: Subjectivity

This section underlines because reinforces how knowledge is different to different people and reinforces the early reference to history. It is something that is reflected in the speakers' values.

She maintains the idea that people have different views.

You mentioned how different EP's see the world, can I unpick that a bit more. Can you explain a bit more of what you meant?

I suppose in terms of psychology what you would see (would be the area) of psychology the one that would answer the question about the world. If you (see workings) of developmental psychology or you are looking at it from a developmental point of view or (1.5) be very keen to do lots of tests; cognitive tests (1.5) looking at (how children relate) whether one would say that a child has ADHD and another would say difficulty with behaviour or approached tasks (*laughs*).

What you are saying is that EP's have a very different way of seeing the world ..?

Maybe. ↑It would be interesting to do a study on that if that is TRUE because if you talk to people about what they would do in a certain circumstance (1.2) and talk to a few other people, you would find that you are kind of doing the same thing but for different reasons.

Then, is it something you feel that neuroscience and the BRAIN is something that only some EP's should focus on ?

It might be tied up to (1.2) how the profession is developing because there might be other people who are doing things that would be MORE suited to thinking about ↓brain states, damage and (1.2) scans↓. I feel that it is a bit more **med**ical and EP are trying to be **prac**tical more But you need to have theoretical background so maybe (1.5) useful for everyone to know **some**thing or know where to find the information as it is changing all the time isn't it (2.5) You might know ONE thing one year and then the next someone has discovered something ELSE or ex**pand**ed the information.

So the profession I guess is in a state of change and (1.5) it would be good for all EP's to have a general knowledge and you are also saying that it neuroscience and the BRAIN is the area of other professions. You mentioned the medical profession…

I was thinking medical and but maybe clinical psychologists.

Stage 5:
Practice

Again, a reference to neuroscience being medical rather than 'practical' may suggest how the construction of medical limits this EP's engagement with neuroscience, ie. EPs are more practical.

And that seems to be different from applications and that seems to be what you are saying about Educational Psychology that it is more about applications, ↑is that correct?

Yes I think it is more the person or the child in the **cont**ext or the family. Obviously it is not (1.8) clear CUT because >>I can't really say that clinical are only thinking about medical they are thinking about context as well<<. But I think the viewpoint would be more medical and think about is as pigeonholing, >>I don't mean that in a bad way<< just explaining it through a medical route.

The term 'pidgeonholing' used perhaps to reinforce the idea of limitation and restriction. It is also interestingly associated with the 'medical route', an earlier reference to this construction is also made.

I guess that would be an issues for SOME EP's?

I don't think that they would want to go TOO much down the medical route.

What kind of things would make it easy for EP's to engage in neuroscience. What is it about an EP that would make it easy for them to engage in neuroscience and understand about the brain?

I would think you would WANT to do it and go out and find the information. I don't think that the information is readily available (1.5) from day to day.

So from you mention WANT. It gives me the impression that there has to be some kind of interest?

I think that is probably TRUE, I could I could be wrong (*hesitant voice)* and I suspect I may well be because my training is so limited in that direction (1.5) I talked to that trainee who is doing a CASE and we asked what do we mean by neuroscience and cognitive assessed neuroscience. Maybe that is already in there. I am curious to know when he has got is case and what he does with it and has promised to speak to me about it to follow it UP, ↑just to get an understanding about it↑.

How far do you think other EP's would be engaged or involved in the area of neuroscience and the brain?

I don't know (2.0) I have not really spoken to anybody about it. Everybody seems to be a bit frightened about it.

Why do you think that would be?

I think because they think that is very difficult. I presume that it is very difficult to understand and getting into something that doesn't interest them or they are uncertain about…

Okay…

I ↑don't know if you (3.0) have neuro-psychological information about a child; how you USE that information (1.2) I remember one pre-school case I had recently of a child who had brain damage when he was very young (.) but he was learning and doing quite WELL, he had a (2.3) diagnosis of ADHD but the >>clinical psychologist said that this child had such brain damage that the child's learning was going to be very limited development<< on the other hand we was doing REASONABLY well. I am very optimistic I want to see children moving ON and having now LIMITS to their learning. I just WORRY that people might feel that is a bit limiting. >People would use it say that this is the limit of this child<; he has got his damage or the way his brain is functioning that he would never be any different. I think that probably EP's are quite optimistic and are always looking for a SNIFF of some progress.

It is interesting that you mention that it is very limiting as opposed to psychologists wanting to be very optimistic about children.

>I don't mean ridiculously optimistic<, I just mean that there is hope that things could change for a child.

You are saying that psychologists may FIND neuroscience quite limiting as a word as opposed to wanting them move forward. So moving forward and being optimistic is different from something being (.) limiting or giving a limited knowledge about something?

Yes I think it is probably more about how people USE it and ones experiences just as an ordinary person (.) of something like neuroscience and genetics, the media interpreting it for you, unless you

Subjectivity:

Use of the emotive term 'frightened'

The speaker feels neuroscience is difficult, and feels uncertainty about the area.

The term limited (repeated 3 times) can be contrasted to optimistic. Many subjectivities are present in this excerpt (Lines 192-204). Worry is another such subjective state referred to (Line 200). Some of the contrast identified are cross-schecked with the interviewee in Lines 209-212.

It is notable that in excerpts 215, the speaker makes reference to the media as a medium through which neuroscience knowledge is filtered.

get training don't you. You get it through the media and they are "we have discovered the gene for xyz " (*as if quoting*)or (2.0) "if you have got that gene you are going to have a certain destiny" (*as if quoting*) Actually, if you sit back and think – well it is just a risk that you might get (.) certain disease, it's not guaranteed THAT in the future. It is using knowledge intelligently I think.

You mentioned the media (2.0) this knowledge were you exposed to through the media

I suppose ↑not so much with neuro psychology but I just worry that it might be LIKE that (2.0) that people might misunderstand and misinterpret the headline.

…are you aware of any developments of neuroscience at the moment as an EP?

°I really don't know very much about it°. I mean I have seen pictures of brain scans in BOOKS but I don't think anyone has ever shown me one of a child I am working with (1.0) for example..

…. anything that would make it easier for and EP to access the knowledge about neuroscience or engage with this agenda?

There seems to be (2.0) the occasional conference that comes through EpNet (2.0) I suppose if Child Health held conferences I would be interested in going to find a bit more about it. I have given my VIEW but it is a view through quite a bit of ignorance (*laughs*) and it would be nice to feel I would have a view with a bit more information would be good.

So attending different places where you get information and knowledge from.

To think that people who PAY for me to go if I didn't pay for it myself would be asking what are we going to SEE, what are we going to get out of it or how is it going to change what you do – I don't really know. ..

Ok…

↑I have not had to justify it but more and more as money becomes tight it is going to (1.8) become this way. We are already supposed to feed back to the rest of the TEAM and (1.8) if you go on any training and >that would be possible to give information<. ↑I suppose until you KNOW I don't really know that you don't know if you understand what I mean (*laughs*). It is a bit tricky (1.2) really I think but you can read articles. There are articles in journals that (.) you °struggle a bit with and try to understand°.

You are saying that you can access the knowledge if you wanted to …

There seem to be some EP's who are actually working as neuro-psychologists (.) I think there was a discussion <a while ago about the title and who was entitled to the TITLE>.

What the title of neuro-psychology or neuro (.) scientist?

If you were going through the route of EP training what would be appropriate. °Peter Rankin°, I don't quite know what his background is but he is sometimes on the internet mentioning things going on.

( ) thank you very much we are going to DE-structure the interview, wrap up and I would like to ask some reflective questions now about how you felt about the interview process and if you have any thoughts. How do you think the interview went?

I think it was fine, >>I have just realised that I am NOT very CLEAR about neuroscience<< in my mind so it is hard sometimes to explain things or to really sort things OUT.

I mean to me that is what the research is all about it is talking about the tensions (.) that EP's talk about and even this reflective PART of the interview is a part of that giving EP's a chance to comment on how did feel about this, why did I feel this, what have I learnt through the process so I suppose I hope that it is more liberating than restricting. So your thoughts were that you felt you are bit uncertain whether you could offer as much information as needed is that what you are saying?

Yes I think so (1.8) it is a tricky area, and I have not had any training in the area so bits I have picked up here and there rather than minutes of logical source or viewpoint.

I just found that interesting I am finding many different things from many different EPs and it is quite interesting you mentioned that EPs' views are varied which I think, in a SENSE from the data that I have come across so far but you were able to talk about that in the context of obstacles because it is so varied we never really know if EPs should engage because it is about interest and motivation.

It is also about reaction, if you go to a talk by somebody, I remember being at a talk a few years ago by somebody who was (2.0) >a real expert on early years. She wasn't a Barnet person< this was a person who could have been an academic and ↑she was talking about some things about the early years. I couldn't really say she was right or not because I didn't really know enough about it↑ but if she had been wrong say (2.0) about it and one of the people from one of my schools were there and said she said this or try to use it as a reason or doing or not doing something (1.6) I think it would be useful to know even to counteract what people are saying (*laughs*).

That is a good point you are making sometimes it is not really about having the knowledge and being informed enough when somebody ELSE gets it right or wrong. I could see where you are coming from, and I guess with some EPs sometimes feel a bit overwhelmed and feel that it is out of their area but it would be helpful to say informed. I was interested in your idea that it is ↑one part of a jigsaw where E's work with the whole system.

↑I think that is what I like about being an EP it is the fact that looking at lots of different viewpoints and pulling them altogether to make a plan of action (*laughs*).

You also mentioned the practical application as opposed to the theoretical (.) which was an aspect of the undergraduate course that you WOULD have liked to have seen in your training then you realised

This part of the interview involves the validation of findings and have strictly not been used for analysis. The sections involves deconstruction of the interview process, and seeks out clarity of the speaker's view points.

From lines 278, the researcher shares some of the aims of the research..

that application is quite important and in fact this is what is > making the changes< in people, the fact that I can go out and do something about it so that also tells me a little bit about the obstacles of trying to engage with neuroscience in that it informs the theory that so much of your work is to do with practise and it is also about the (.) political climate, you mentioned funding an lack of money and the PEP kind of asking, or maybe you feel a bit uncomfortable being asked what is this training going to do for you.

It is even having to justify it in my own HEAD (*laughs*). I can ask for it and not feel embarrassed by it when they say no! (*laughs*).

In saying that you seem to be an EP that is quite cautious and you quite delving into things, you really do ask questions and interrogate yourself, so that is all the process of thinking why or why not you might feel comfortable about neuroscience so again it is telling me a lot about your profession (.) the tension, the obstacles you feel are in the profession that make it difficult or easy to engage with neuroscience. And you also seem to talk about different worldviews. That has certainly taught me a lot. So although you feel that you may not have added much I feel that I have got a very rich picture and a very different picture compared to what I have had previously so thank you very much.

>>Yes but not swallowing it WHOLE and not being uncritical, you have to be critical but (.) I mean that is how we are trained to be critical<<

Yes am just looking for different views. So I just wanted to see if there were patterns of meaning and if there are pattern emerging in EP's °talking about that so I really quite enjoyed that°. Have you learnt anything about your own views?

I think that they are a bit hazy (*laughs)*, but I think I KNEW that (1.8) I pick up things from all sorts of places so it's all a bit jumbled and (2.0) I think it is interesting that even if you go to see a film that maybe a little bit science fiction, there are been quite a few films over the last 10 years about >different societies that have had different philosophies< and you think that I would only like to go so far down that road and that

makes me a bit cautious about going down any road too FAR and just to be careful and to balance things, to use it as being something useful rather than just dominating.

Very interesting finally (1.8) is the interview what you expected it to be?

Yes broadly speaking because >>initially I thought it would be more about neuroscience<< and °I don't know (much about) the bits and pieces of neuroscience° but I was really assured when it wasn't it was more about VIEWS about neuroscience. That was good (*laughs).*

I thought as it was part of the thesis I would really like to know about how my profession talks about (.) rather than just going down the route, so although I don't have much knowledge of it myself I am really interested about investigating what EPs think about it.

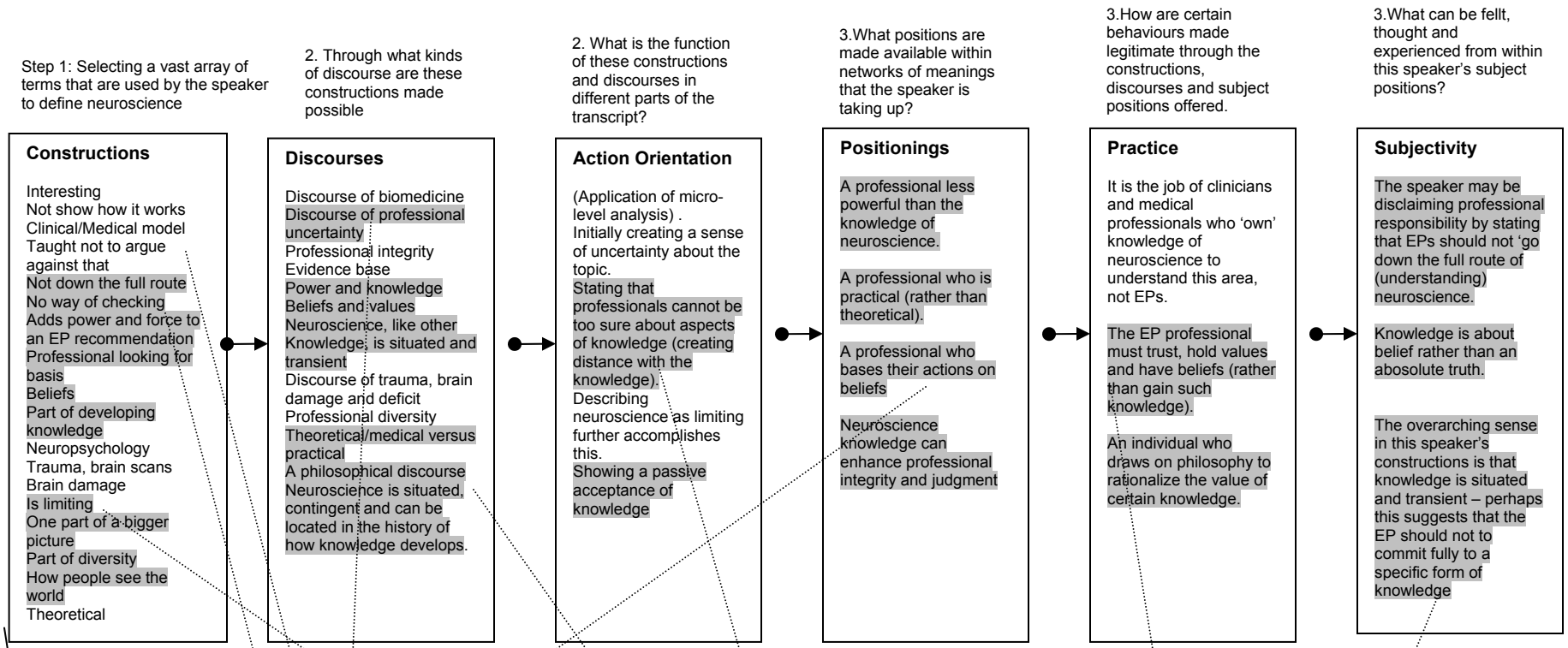
Thank you so much for contributing to that and I have enjoyed the interview with you.

You are welcome.

Although direct quotes from this part of the transcript have not been used, points are noted which appear to reinforce certain constructs. 'Cautious' reflects an earlier subjectivity expressed. 'Any road too far' (L. 339) seems to revert back to the idea of shutting off routes

Appendix M: Analytic Process Chart

ANALYTIC PROCESS CHART



Evidence and sample quotes from texts to support

Like everybody I'm not really sure how it works. I suppose it's more a medical model that is my *impression about psychology and neuroscience* and I have been trained not to argue against that. (Lines 48-51)

Can I explore that a bit more, you feel that people or EPs should start to think about it more?
I think people should at least know about it and some of the issues. I suppose my impression it is one of these things that one shouldn't go down the full route and say that is what we do

I think it probably is important for any professional that what they do has some basis and as much fact as you can discover about it, you should look at the history of how knowledge develops. It is a lot about beliefs, we believe certain things (Lines 72-75).
But I find this area interesting. At the same time I am sceptical, I don't want to shut off routes for people to improve.
It's about how people see the world and how you do your job can be quite different; I think that diversity can be either a weakness or a strength but it means that people get a different view and you are not necessarily going to get the same thing.

Development of the Analysis
The analysis is considered fulfilled once the interconnections are made between each of the steps/ stages, and a range of evidence/quotes from the transcript have been used to support this. The researcher highlighted certain concepts and terms in each stage which can provide a coherent 'story' which responds to the research question.

Discursive Site
The discursive site is identified from what is salient and distinct in this particular speaker's constructions of neuroscience. The reference to knowing and 'knowledge' for example is repetitive in the speaker's constructions. A particularly notable example from the transcript seems to encapsulate the idea that knowledge is situated and contingent and discourses and subject positions are made possible from the construction evident in the transcript. The selection of references from transcripts therefore draws together some interconnected ideas, leading to the choice of this discursive site.

Appendix N: Foucault, a Geneaology

Foucault (1966) talked about providing a geneaological analysis of a topic to fully appreciate how it has evolved as a piece of circulating knowledge in society. Dreyfus and Rabinow (1983) state that Foucault aimed to rediscover on what basis knowledge and theory became possible' (in Gallagher, 2007, p. 17). The following is the researcher's attempt at a geneology which was ultimately not included in the body of research due to word limitations.

Historical shifts in views about neuroscience: A Geneaology based on Foucault (1966)

These sections will briefly visit the historical context of neuroscience, before considering how contemporary views about the discipline have emerged. The search alone shows that neuroscience has always been preoccupied with the processes of learning and has only recently developed links with the field of education.

Early Philosophical Roots of Neuroscience

Foucault talked about providing a geneaological analysis of a topic to fully appreciate how it has evolved as a piece of circulating knowledge in society. The researcher noted that texts and publications reviewed present an evolution in the status of neuroscience as a topic of shifting debate and discussion. Early reference to the brain in prominent textbooks make reference to key figures in history who have made contributions to neuroscientific thinking, specifically in relation to the brain and its role in learning. Some of these early references and historical tensions are highlighted here to illustrate how the bases of present-day arguments about the brain's role in learning may have taken shape.

Early references to the brain were linked to philosophical discourse. Hippocrates for example viewed the brain as the 'seat' of intelligence, while Aristotle speculated that the heart was the centre of intellect while the brain served to 'cool the blood'. Plato, however, viewed the brain as the 'rational part of the soul'. Though the ideas varied, these early references seemed to suggest that intellect and consciousness had a 'location', a *seat*, an area devoted to mental capacity.

A significant contribution to an understanding about the brain's role came from Italian philosopher, Descarte (1639, in Clarke, 1982). Descarte presented the first challenge to the assumption that the brain had an exclusive role in intellect through his philosophical position. Firstly, Descarte used the metaphor of mechanics in describing living things. For

example, he believed that most internal bodily reactions in all living things occurred automatically, such as biological processes and reflexes (Carlson et al 2000), and therefore had a mechanical characteristic. However, Descartes also referred to the concept of the 'mind' as influencing human thought. He believed that what set human beings apart from all living things was their possession of the mind, which was their unique attribute. For example, thinking or reasoning would be the premise of the mind, while physical bodies do not think or reason. By proposing a distinction between the two entities, the mind and body, Descarte was one of the first figures to give birth to the notion of dualism, and this had a major impact on forthcoming conceptualizations about the brain.

Dualism is an idea that represents a dichotomy in thinking. It refers to the notion that existence (for example, the processes of consciousness and thought), can be reduced to only one influence. Linguistically, dualism can be represented as an either/or argument, eg it is *either* the mind *or* the physical body that influences us.

Descartes attempted to resolve the mind-body tension by proposing that although the mind and body are divided, they also interact. Hergenhan (2001), for example, refers to Descarte's idea of *interactionism* which is the view that mental events (processes of the mind) emerge from brain activity and can influence further brain activity and therefore behaviour, having a recursive effect. These early debates suggest that there were no unified understanding about the brain's role, and that the idea of the mind and its distinction from the brain was not easily understood.

Dualism has been the source of discord within various disciplines, such as medicine and philosophy. The notion of dualism has also been one of the most prominent arguments at the heart of philosophical debates about brain in the very modern-day discipline of psychology.

Neuroscience and Psychology

The foundations of the field of psychology came about in the late nineteenth century, however, as Goswami (2004) maintains, neuroscience and psychology have shared philosophical roots, in that the controversy of dualism also appears to be present throughout the development of the field of psychology. Psychology, defined as the 'science of the mind' (Carlson et al, 2000) has a history of unresolved ideas about the brain, and it relationship to the mind. Psychology was a discipline that aimed to develop theoretical understanding of human behaviour, but also used such theory for the application of different approaches to help human beings in their everyday life. However, as Carlson et al (2000) maintains, from its early history, Psychology's evolving view of the nature of the 'mind' has frequently been called into question, and this lead to tensions

about what aspect of the human should be the focus for change. For example, Carlson writes,

Early in the development of psychology, people conceived of the mind as an independent, free-floating spirit. Later, they described it as a characteristic of a functioning brain whose ultimate function was to control behaviour. Thus, the focus turned from the mind, which cannot be directly observed, to behaviour, which can. And because the brain is the organ that both contains the mind and controls behaviour, psychology very soon incorporated the study of the brain'. (p. 4)

The focus of debate in this extract is that the mind was unseen and did not exist materially. There were instead two influences, the brain and behaviour, which were used to explain the concept of the mind. Today, Blakemore and Frith (2008), two leading voices in the brain-education agenda, appear to put an end to this conundrum by asserting, 'When we refer to *cognition* or *mind*, we do not mean to separate them from the *brain*. We believe that the brain and mind have to be explained together. (p. 7).

Behaviourism was a movement which focused on human behaviour, or 'how people act in everyday life, and in how they can be influenced' (Brainsby, 2005, p. 15). Behaviourism appeared to focus on actions and consequences as two processes which influenced human learning. Since behaviour was observable, it received greater interest and attention in early psychological theories about learning, such as in the work of Watson and Skinner. In terms of the brain, there was acknowledgement that the physical matter of the brain was worthy of exploration, but due to difficulties investigating the brain, the scope for research into the brain was small. This appears to indicate that psychological knowledge was very much influenced by the methods and tools available to understand the mind, and approaches were determined by the accessibility to the area being studied.

Psychological textbooks however, cite a handful of studies about the brain which were used to describe the biological bases of human processes. In terms of the area of *learning*, two notable studies about language-production dominate the literature. For example, the work of Broca (1868) and Wernickes (1874), respectively identified regions of the brain responsible for the production of speech and comprehension. These findings seem to revert back to the idea that certain areas of the brain were devoted to certain functions. This paints a picture of the brain as an organ which had different parts, and each part responsible for certain skills. The understanding that developed therefore, was that if a part was missing, the person would no longer produce the skill the component of the brain was responsible for. Attempts were made at justifying the benefits of such research:

Craik (1943) states for example.

> *In any well-made machine one is ignorant of the working of most of the parts – the better they work, the less we are conscious of them…. It is only a fault which draws attention to the existence of the mechanism at all' (Craik, 1943).*

In this analogy of the brain as machine, Craik suggests that that it is a certain 'fault' or problem which aids understanding about the presence of its various components and what each are responsible for. Goswami (2004) likens this to putting together pieces of a jigsaw, in that each piece can give us clues about the intricate processes of human learning. Textbooks cite findings from people with brain lesions or brain damage, whose areas of fault could help establish understanding of the component of the brain that was missing. The problem could then help identify the characteristics of a normal-functioning brain. Concepts such as *localization* or *specialization of function* emerged in brain-related research to refer to areas specifically linked to certain skills or knowledge (Brainsby, 2005). However, this simultaneously gave rise to inverse concepts, such as 'deficit' function, in that simply labelling those with a deficiency was not helpful or progressive. Such terms began to produce discord about the role of the brain in psychological knowledge.

One other paradigm that had a huge impact on psychological theories about learning was cognition. The cognitive revolution arose due to the gradual recognition that there are other processes at work in the human mind, and these were not necessarily explained by behaviour alone. The brain seemed to be somehow restrictive in shedding light on these processes, partly due to the limitation of tools. Research continued to focus on 'activities' that people carried out, but also, how these activities indicated that a certain 'function' in the mind was being achieved. Therefore, although the brain could not be studied directly to understand human thought processes, these processes could be *inferred* from studying the observable element of behaviour. Theorists began to produce 'models' of such aspects of memory, attention and reasoning, labelling these as cognition. In the 1960s, information-processing analogies of cognition emerged to coincide with the development of the computer revolution (Brainsby, 2005). This lead to views about the human mind being like a computer. Cognition was thought of as representations of different psychological processes, and these processes could be simulated using a computer-type model.

However, the 'space' which held cognition was referred to recurrently as a 'black box', in that cognitive processes were not supported by a physical structure, but remained a series of hypothetical constructs which were used to explain the intricate processes of the human mind. The cognitive revolution lead to its own pathways of controversy. On the one hand cognition could be viewed as a construct which marginalises the brain (as

the models were seen as sufficient enough to understand the mind), or on the other hand, as Tommerdahl (2009) has argued, cognition could be viewed as things the brain does anyway. However, as yet there continued to be limited research into the brain to validate this claim.

At present both cognition and the brain is studied through the experimental paradigm. A search on the PsychInfo and PsychArticles databases pre-1990 reveals that brain-related research uses the theoretical models of cognition to carry out experiments. The characteristic of experimental research is to simulate controlled environments to test out cause and effect relationships. The database searches revealed therefore that neuroscience has been embedded in experimental language. The studies also use specialised language about the area of the brain and certain brain processes which are linked to cognitive tasks.

This section has revealed that :

1. The philosophical views about the brain in early history gave rise to the notion of dualism.
2. Psychology attempted to study the brain and behaviour to understand the mind.
3. However, there was acknowledgement that intricate processes also took place inside the mind, such as reasoning and thinking, that weren't easily explained by observing behaviour alone.
4. The cognitive revolution took place, but critics of cognition stated that cognitive processes were only hypothetical constructs that were 'inferred ' from behaviour, and there was no reference to biological structures to support theories of cognition.
5. Brain processes had little coverage in psychological textbooks, and this was linked to the limitation of methods.
6. Brain research was typically made through experimental paradigm. These are evidence in the types of databases where brain research appears, numerous studies are cited in prominent psychology databases– revealing the close research association between psychology and neuroscience.

Psychology in the present-day

The discipline of psychology has made changes through time. Due to a need to apply theory in ways which would help human beings, there was a shift in the focus to a preoccupation with meanings and contexts. For example, the social psychology movement of the 1970s gave rise to the critical psychology paradigm, which overthrew the early 'deficit' models of human development, suggesting that these models limited understanding about human potential. It became apparent to psychologists that it was these factors that were helpful for the creation of change and than the identification of deficit and function. Discussion of the brain became dormant in psychology, due to the need to move away from identification, to a focus on solutions and change.

The researcher finds it relevant to look briefly at the field of education, since current-day debates identify the new alignment that is being made between neuroscience and education.

Neuroscience and Education: A comparison

The link made between the two disciplines of neuroscience and education is only a recent phenomenon, occurring mainly in the past two decades (Howard Jones, 2007). This section turns now to the field of education, which is relevant to the debate about the integration of the field of neuroscience with the discipline of education. The following discussion begins with the standpoint that although neuroscience has always been preoccupied with the processes of learning as has been shown in the previous review of literature, its links with the discipline of education is something new.

Education is concerned with the processes of learning. Education can be characterized as a force responsible for the development of large segments of society (Samuels, 2009). Historically, it has been distinct and exclusive, reserved for privileged few in the population, and incorporated some aspect of religious training. Samuels talks about the development of the 'printing press' in 1447, which enabled a large number of people to become educated and have access to important religious and scientific documents. This however set the stage for discord to arise between the fields of education, religion and science. There was a divide between those who wanted to preserve the status of education as promoting morales, values and beliefs and on the other hand, those who put more weight on scientific knowledge. As Samuels' recounts 'Universities, which often began as religious institutions, gradually shifted to align themselves with science more than religion, contributing to fragmentation within education (2008).

The polarized positions of education and science that Samuels presents, seems to suggest that while scientific thinking has historically been respected and venerated, education has not been given the same importance. Samuels states for example that 'Historically, science and education have demonstrated separate, but interwoven, influences on society that have led to a characterization of science as prestigious and education as 'insular and fragmented…' Education, for example, has had a different history and situatedness than science, and its methods and tools for enquiry have always been different. Samuels draws on dichomoties that have defined science, as opposed to those which have defined education. Contrasts between empiricism and rationalism, qualitative and quantitative methods for example, have been drawn to distinguish the two fields.

Samuels (2009) further states that education ‘practices and qualities have varied widely between regions. As a result, education displays local characteristics and its quality is often diverse, lacking the singular identification that has unified science’ (p. 46) Also, education research is concerned with broad meaning as opposed to ‘specification; The position and status of these two fields have a number of implications, which include incompatibility of discourses between the field of education and the field of neuroscience.

Such accounts of the differences between education and science, their varied epistemologies and histories suggest that they have evolved as two distinct and separate fields. These can contribute to the divided opinions of the place of neuroscience in current understanding of learning, which have circulated in different texts and journals.in the present day.

Conclusion of the present Genealogy

So far, the historical shifts in references to the term neuroscience suggest that neuroscience has been embedded in different contexts over time. In the context of socio-historical discourse that has been given here, neuroscience can be seen as an ‘active’ term, taking on different meanings, ideas and references. The account so far has shown that neuroscience has shared an early history with understanding about learning, and has informed and influenced the field of psychology. It is also set up and contrasted against the field of education. Such references have suggested that there are many available meanings with which neuroscience can be understood, and a viewpoint expressed by any one discipline, can also draw on any one of these historical discourses to justify, accept or reject claims about the brain and its links with learning.